TECHNOLOGY DEPT.

February 2, 1942

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DETROIT

STEEL

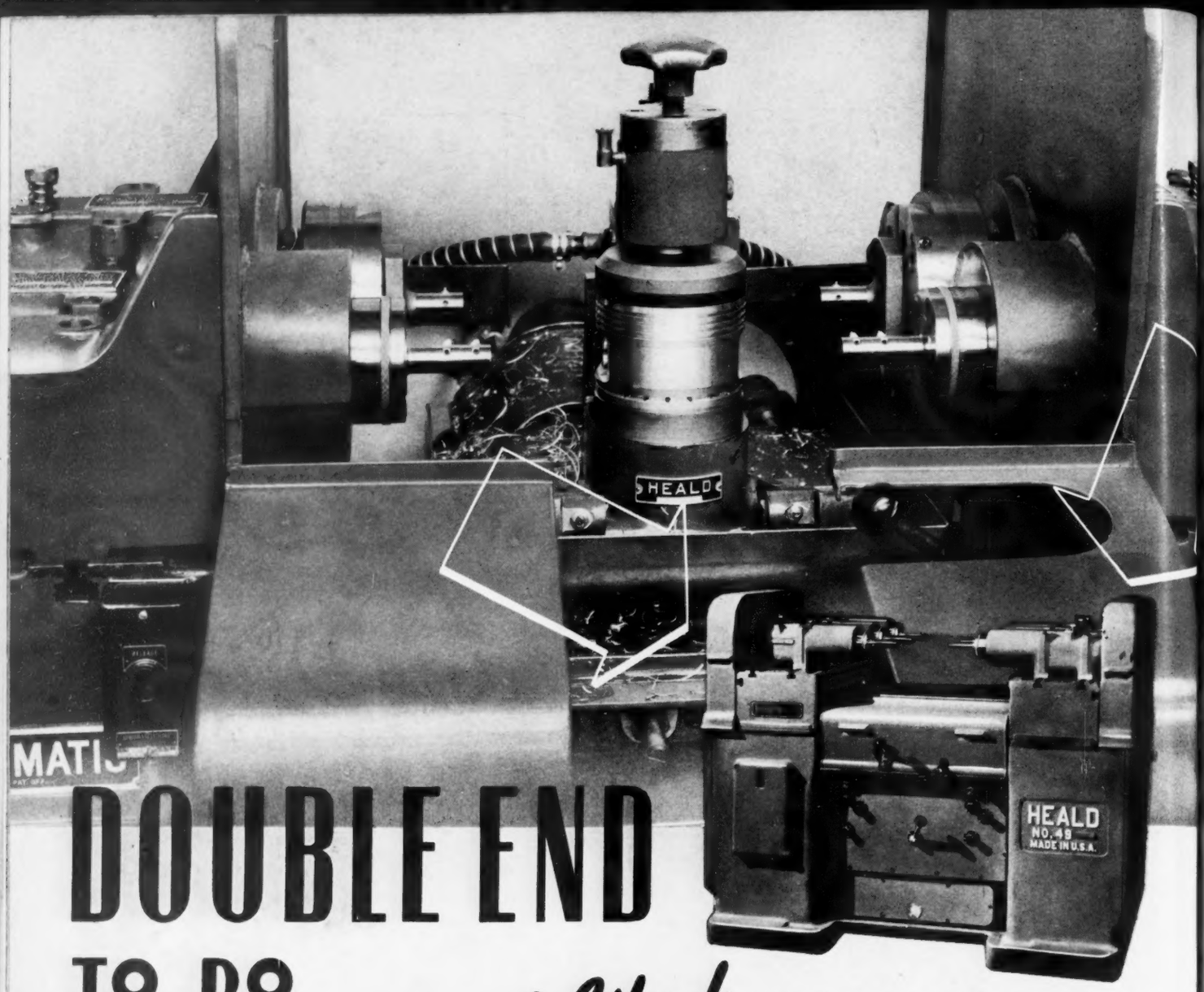
PRODUCTION • PROCESSING • DISTRIBUTION • USE
ESTABLISHED 1882

For Quickest Possible Deliveries

Concentrating our great manufacturing facilities on the production of ball bearings to established American *standard* metric dimensions and tolerances.

Government and industry are cooperating in speeding defense with *standard* bearings.

New Departure
THE FORGED STEEL BEARING



DOUBLE END TO DO *Twice as Much Work*

Double end Bore-Matics are built in three different sizes — Styles No. 45B, No. 46B and No. 49B — which enables selection of the right machine for every double end boring job. Illustrated above is a double end No. 49 Bore-Matic which bores and counter-bores both piston pin holes with front opposed heads and grooves pin holes with heads at rear.

TWICE as much precision work per cycle . . . that's exactly what can be accomplished on Heald Double End Bore-Matics . . . because these machines are arranged to perform borizing operations AT TWO ENDS by means of opposed boring heads and table traverse in both directions. Briefly here's what you can do on Double End Bore-Matics . . . borize multiple parts in a single cycle . . . semi-finish and finish borize one or more parts in the same setting . . . borize surfaces dead in line in opposite ends of one or several parts . . . perform a series of progressive operations on the same part or several parts. Heald Bore-Matics are available, too, as single end machines for borizing from one end only. Altogether there are ten different styles of Heald Bore-Matics in both single end and double end types to exactly meet your requirements in precision finishing. Write, phone or wire us for complete details, today.

BORIZE FOR PRECISION

THE HEALD MACHINE CO. WORCESTER, MASS. U. S. A.

Introducing...

HOT-WORK 8

Bethlehem's dependable new Hot-Work tool steel

If you forge, shear, bend or otherwise form any metal at temperatures up to 2000 deg. F., so that the tool itself reaches dull red heat, Bethlehem's new high-molybdenum hot-work steel offers you a number of advantages.

This steel—called Hot-Work 8—stays tough, withstands both shock and abrasion at elevated temperatures. It resists "heat-checking" or "washing" when repeatedly heated or cooled. Finally, this steel may be simply and safely quenched in either oil or air, with resulting superior "red hardness."

Typical analysis of Hot-Work 8:

C=.62 Cr=3.75 Mo=8.50 V=1.75

Hot-Work 8 steel should be pack annealed at 1550 deg. F. For best results in hardening, preheat the steel to 1600 deg. F.; bring rapidly to 2200 deg. F. in high-heat furnace and oil quench; temper at 1120 to 1280 deg. F. depending upon application.

The following applications are a few for which Hot-Work 8 is particularly well suited: crowners, dollies, hot headers, punch and die inserts, compression rivet sets, hot shear blades, spike cutters, trimmers, coupling dies, gripper dies, hot heading dies, hot nut dies, and many other similar uses.

Caution: Hot-Work 8 tool steel should never be water quenched for hardening. In service, the tool or die is often kept cool by the use of a steady stream of water. However, if the tool should become hot in service, it should not be cooled in water because of the danger of cracking or distorting. Nothing more drastic than an air-blast should be used for this purpose.

Write for complete details on Bethlehem Hot-Work 8 Steel. They are yours for the asking.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

RESINOID BONDED WHEELS BY BAY STATE

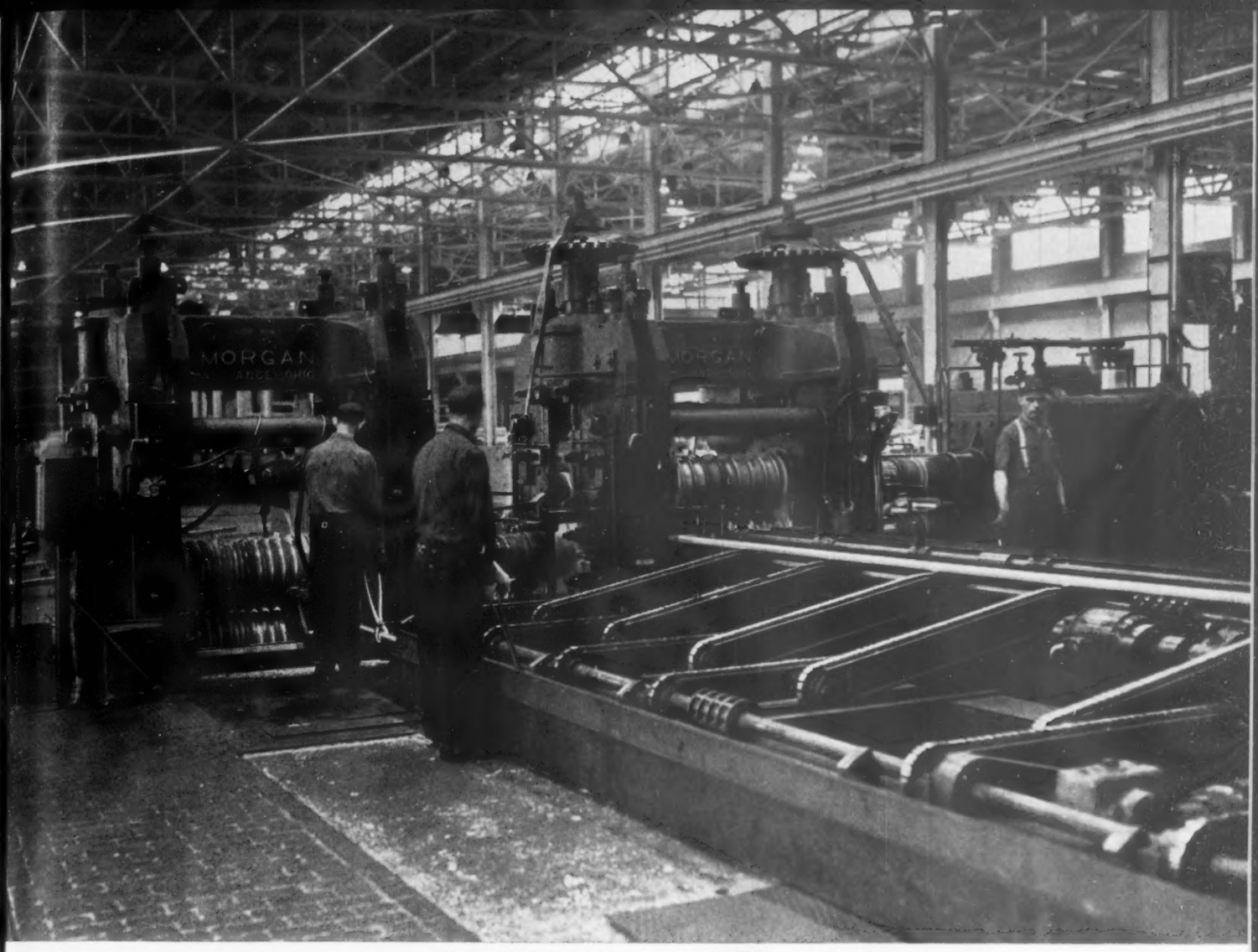
BUILT TO BEAT PRODUCTION SCHEDULES . . . . . .

It's for just such rugged, continual use that BAY STATE resinoid bonded products are manufactured.

You know you're equipping your machines with the best when you use BAY STATE products because a high quality reputation supports your selection.

On to victory with more production! That's your aim and ours. March along with BAY STATE!

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASSACHUSETTS, U. S. A.



BUILT BY MORGAN *Engineering*

ROLLING ALUMINUM FOR DEFENSE

● Among the many types of mill equipment built by Morgan, is the above mill consisting of two 22″ and two 18″ 3-high stands driven by one 22″ 3-high and one 18″ 3-high pinion stand, for rolling aluminum shapes. With this installation was furnished three oil hydraulic cropping and cutting-off shears to handle up to 5″ x 5″ aluminum billets. On such equipment for maximum production, the rugged stability of Morgan Engineering is well established, long since proved by the largest producers.

DESIGNERS • MANUFACTURERS • CONTRACTORS

BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS
ELECTRIC TRAVELING CRANES • CHARGING MACHINES
INGOT STRIPPING MACHINES • SOAKING PIT CRANES
ELECTRIC WELDED FABRICATION • LADLE CRANES
STEAM HAMMERS • STEAM HYDRAULIC FORGING
PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

THE MORGAN ENGINEERING CO., Alliance, Ohio
Pittsburgh, 1420 Oliver Building

THE MORGAN ENGINEERING CO.
ALLIANCE, OHIO Pittsburgh, 1420 Oliver Bldg.

Behind the Scenes with STEEL

Why Worry?

■ We stole this bit of philosophy from the interesting little house organ published every month by the Lamson Corporation, Syracuse, N. Y.; it apparently having been received from England by Bert Powell in their New York office.

"If you live in Britain you are one of two things, you are either in a dangerous area or not. If you are not, you need not worry, if you are in a dangerous area you are one of two things, you are either bombed or not bombed. If you are not bombed you need not worry, if you are bombed you are one of two things, you are either injured or not injured. If you are not injured you need not worry, if you are injured you are one of two things, you are either seriously injured or not seriously injured, and if you are not seriously injured you need not worry. If you are seriously injured you are one of two things, you are either recovering or dying. If you are recovering you need not worry, and if you are dying you can't worry much longer—so there is no need to worry at all, ever—at anytime!"

Squeeze Play

■ So it would seem that if you're in business today, you are one of two things. You are either making a lot of money or you aren't. If you're making a lot of money, you needn't worry because Mr. Morgenthau will take care of it for you, and if you aren't making a lot of money you needn't worry either because you'll have just about as much left as if you were making a lot of money—so why worry?

Hats Off!

■ Certainly STEEL's editors have had few worries on the Yearbook issue having been a rousing success, but if any existed at all this letter from A. D. Walter of Pittsburgh would surely scare them away in a jiffy:

Every year I feel more and more the value of the Yearbook issue of STEEL. This time, there can be no doubt that your 1942 issue tops them all.

I spent a most pleasant and profitable evening going through the book, and I don't see how any man interested in the metals industry in any way can afford to pass up this review of the past year and the many authoritative opinions which you have published on the year to come.

We take our hats off to STEEL and to the men who create it!

Parting Bouquet

■ And James Veitch, who was recently transferred to the general office at Weirton Steel, adds to this week's bundle of orchids at the same time he is cancelling the personal subscription he has had for several years. He writes:

I now have STEEL available here regularly each week and therefore regret to say I am dropping my personal subscription to the best trade magazine on the market.

Shades of '32

■ Emil Kreutzberg, STEEL's Eastern Manager and gentleman extraordinary, called on a defense plant up in New England last week and in doing so had to side step a large dead rat right outside the front door. Inside, a uniformed policeman quizzed him as to the nature of his business and asked him to wait a few minutes to see his man. Meanwhile another salesman who had apparently just been up against a very tough purchasing agent, came out, and as he was putting on his hat and coat, Emil happened to ask the policeman if he had seen the corpus delicti outside the door. So both the officer and the salesman stepped to the door to have a look. The copper grunted and the peddler caustically commented that the poor thing had probably just starved to death trying to get some business out of a certain purchasing agent he knew.

Alcoa Has A Word For It

■ The Aluminum Co. of America has coined a new word: *Imagineering.* It's the fine art, they say, of deciding where you go from here. It's the act of thinking about what you are going to face, and doing something about it now. *Imagination* plus *engineering* is a formula for the future you're going to hear more about.

War Note

■ Our war effort knows no bounds. The lace and embroidery industries now have a full time consultant in Washington but we shall relieve you quickly of any suspicion that our fighting forces are becoming Lord Fauntleroys. The lace industry manufactures such important items as mosquito netting and camouflage netting and the embroidery industry makes chevrons and other insignia for the Army and Navy.

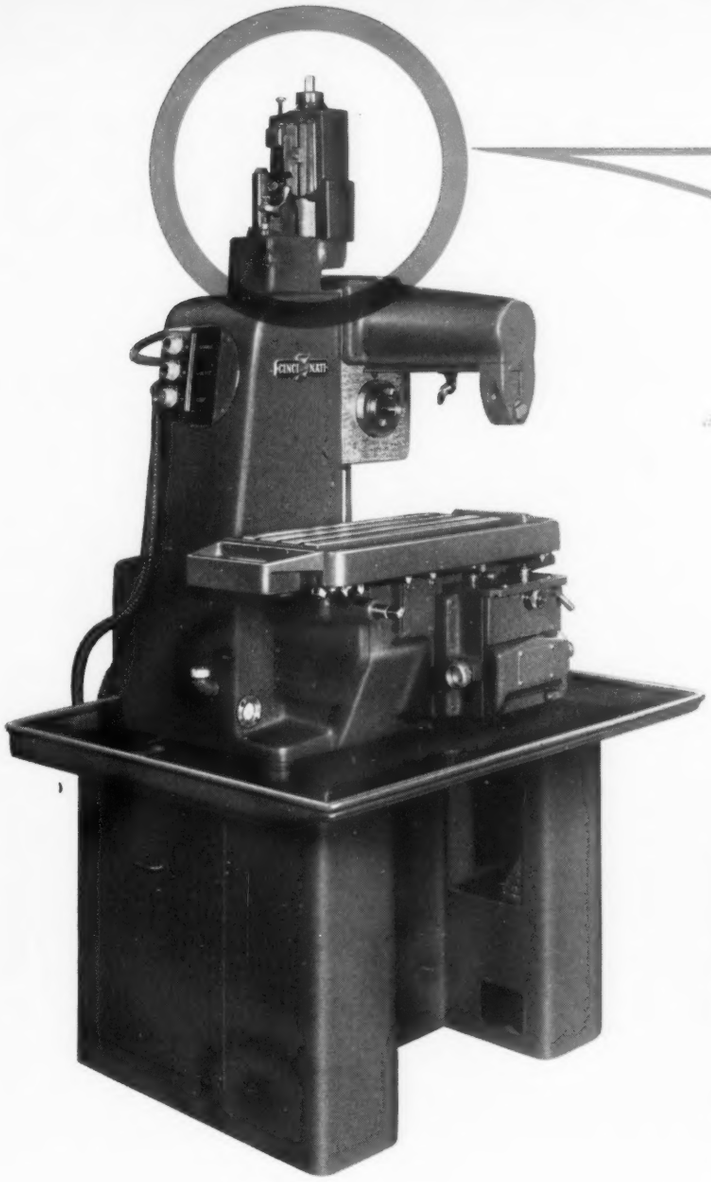
Headache Cure

■ In an official release from OPA on the establishment of maximum prices on aspirin, caffeine, citric acid and vitamin C, it is noted that the consumption of all four of these drug products has been stimulated by the country's war effort. And facetiously, our news editor in charge of priorities, allocations and prices has scribbled in the margin: *Especially in trying to figure out some of these OPA and OPM orders.*

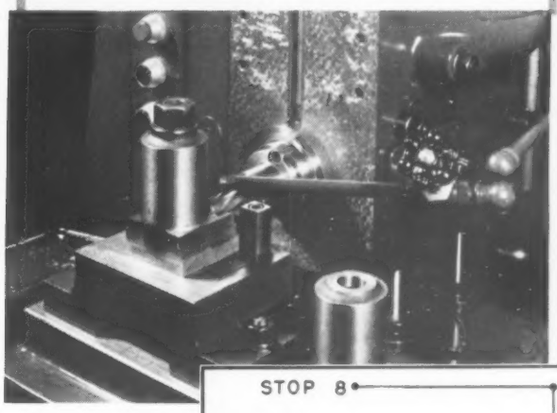
Of course, he's just kidding because all he has to do is turn to his own brain child—STEEL's special section on Priorities, Allocations and Prices and there are the answers all in a row.

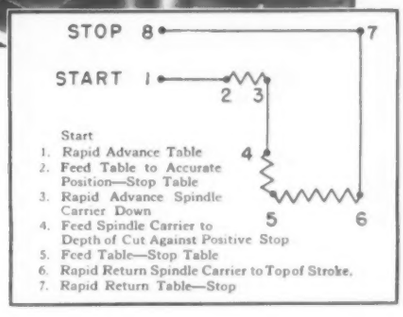
Vol. 110, No. 5, February 2, 1942, issue of STEEL, published every Monday at Cleveland, O. Entered as second class matter at the postoffice, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issued, $2.00.

Buy A Defense Bond—Today!



IT TAKES THE OBSTRUCTION JUMPS *Automatically*





The illustration above, with the explanatory cycle diagram, shows a typical example of the type of job handled on the CINCINNATI 0-8 Plain Automatic Miller with Automatic Rise and Fall Spindle Carrier.

AN obstruction in the path of a milling cut brings these time-consuming manipulations to mind: Adjust table—raise knee to depth of cut—(mill)—lower knee—rapid traverse table to clear work of cutter. The CINCINNATI 0-8 Plain Automatic Miller, equipped with Automatic Rise and Fall Spindle Carrier, does all these things *automatically; quickly;* far more *accurately* than can be done by hand adjustments of the work to the cutter.

The 0-8 qualifications of closer accuracy and higher production than ever before, fit admirably into the production of the many intricate mechanisms required for both peace-time and war-time equipment. Brief specifications will be found in Sweet's Catalog File. More complete information may be obtained by writing to us for catalog M-964.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . DIE SINKING MACHINES

FAMOUS LIFE LINES

1 NORTH ATLANTIC CONVOYS, life lines of Britain's entire domestic and war-time economy, are transporting hundreds upon hundreds of American motor vehicles, most of which have their own "life lines"—gas lines, oil lines and hydraulic brake tubes — by Bundy.

Acme

2 TELESCOPIC AERIALS, life lines of successful radio reception — like the aerial on your car or on this army "walkie-talkie" — are more and more frequently made from Bundy steel or Monel tubing.

International

NEW TUBING uses spring up every day, and in a surprisingly large number of cases, if these uses call for tubing within the range of Bundy's sizes, one or another of the three types of Bundy tubing will do the job required.

For Bundy tubing—with its strength, its ductility, its resistance to vibration fatigue, and the ease with which it may be fabricated—is adapted to a wide range of mechanical uses in addition to its long recognized excellence for transmitting hydraulic pressures, or for carrying lubricants, fuel and refrigerants.

Structural tubes for furniture, lamps and fixtures, spacers, conduit tubing, capillary tubing — these are a few of the less well known peace-time uses of Bundy tubing. And each of them has its similar use, or its counterpart, in defense manufacture.

Do you use tubing in or near Bundy's sizes? Then perhaps Bundy can help with your tubing problem, whether you require tubing only in commercial lengths, or prefer to have Bundy furnish you complete, fabricated parts with necessary fittings assembled. Bundy Tubing Company, Detroit, Michigan.

BUNDY TUBING

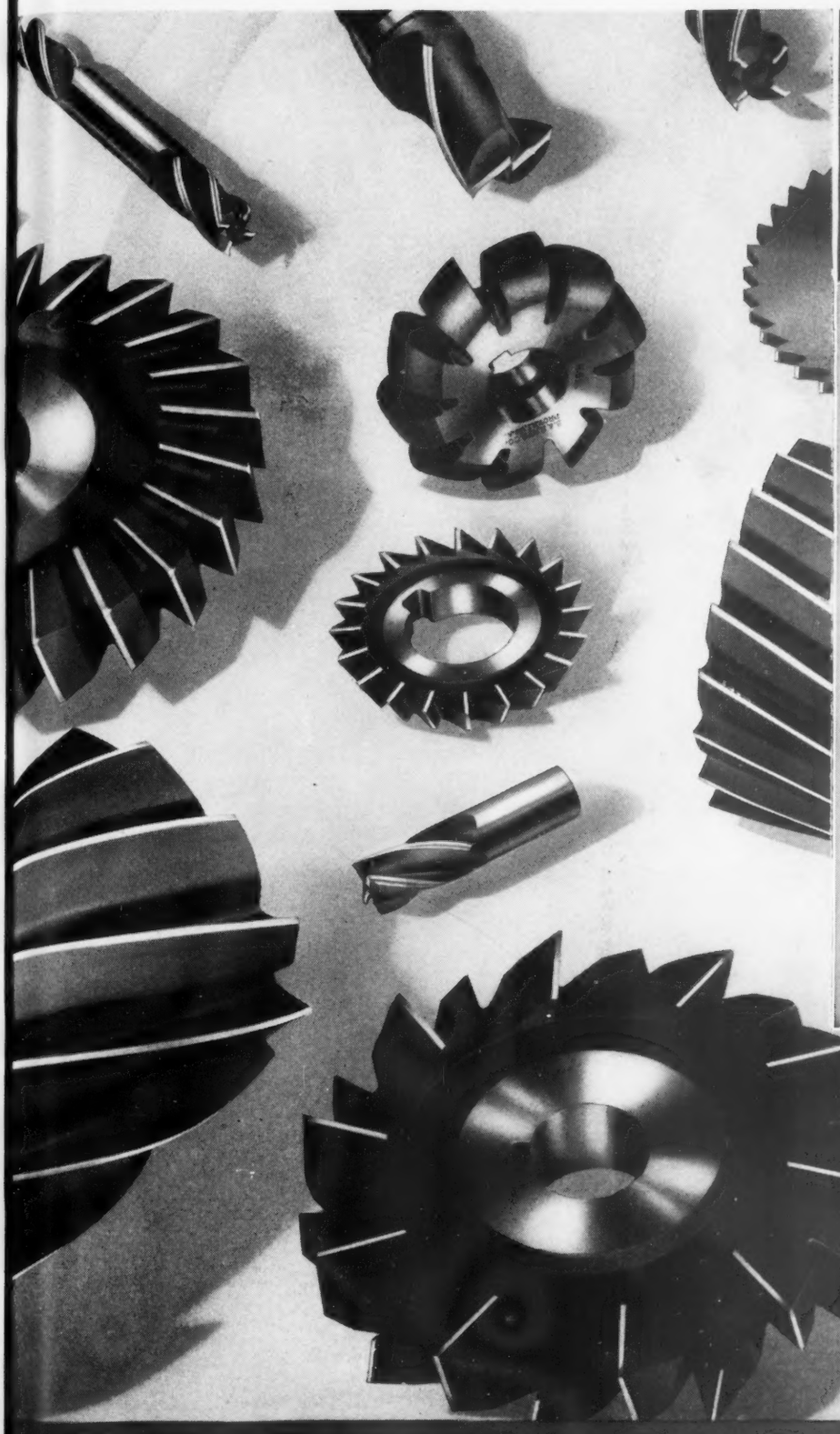
ENGINEERED TO YOUR EXPECTATIONS

BUNDYWELD double-walled steel tubing, hydrogen-brazed, copper-coated inside and outside. From Capillary sizes up to and including $\frac{1}{4}$" O. D. This double-walled type is also available in steel, tin-coated on the outside, and in Monel.

BUNDY ELECTRIC WELD steel tubing. Single-walled — butt welded — annealed. Also furnished tin-coated outside if desired. Available in sizes up to and including $\frac{5}{8}$" O. D.

BUNDY "TRIPLE-PURPOSE" MONEL tubing. Double-walled, rolled from two strips, joints opposite, welded into a solid wall. Available in all Monel, Monel inside —steel outside, and Monel outside—steel inside. Sizes up to and including $\frac{5}{8}$"O. D.

QUALITY CUTTERS PROVE THEIR WORTH



SERVING TODAY'S URGENCY

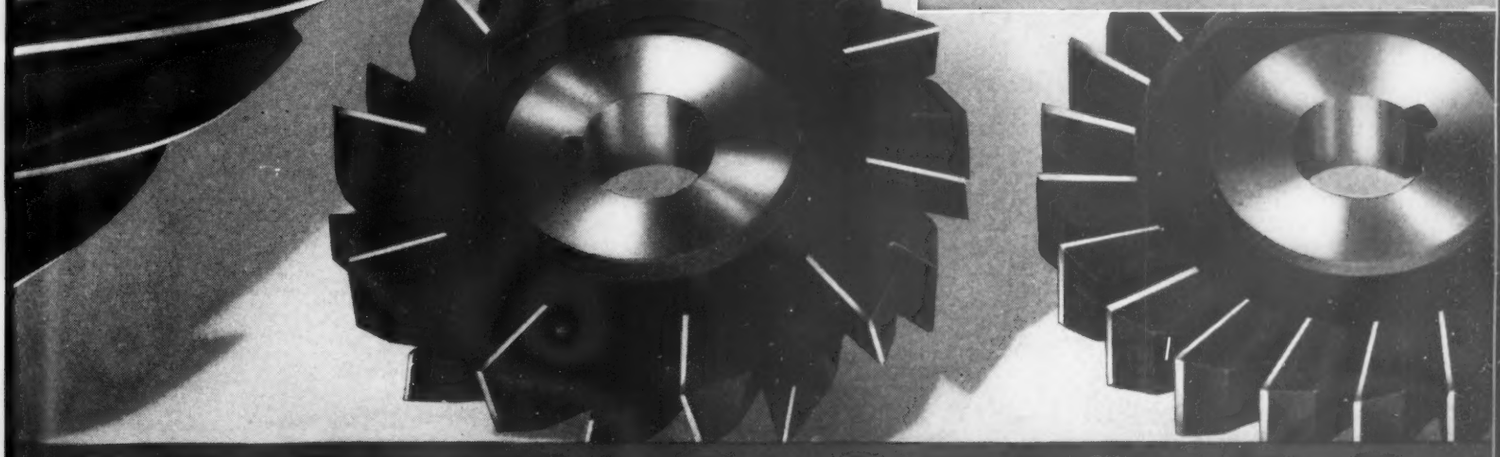
—They "stand up" under fast speeds and feeds... and give **maximum** performance

- Plain Milling Cutters
- Side Milling Cutters
- Inserted Tooth Cutters
- Spiral End Mills
- Key Seat Cutters
- T Slot Cutters
- Shell End Mills
- Angular Cutters
- Convex and Concave Cutters
- Corner Rounding Cutters
- Metal Slitting Saws
- Rotary Shears
- Screw Slotting Cutters
- Sprocket Wheel Cutters
- Ground Formed Cutters
- Gear Cutters

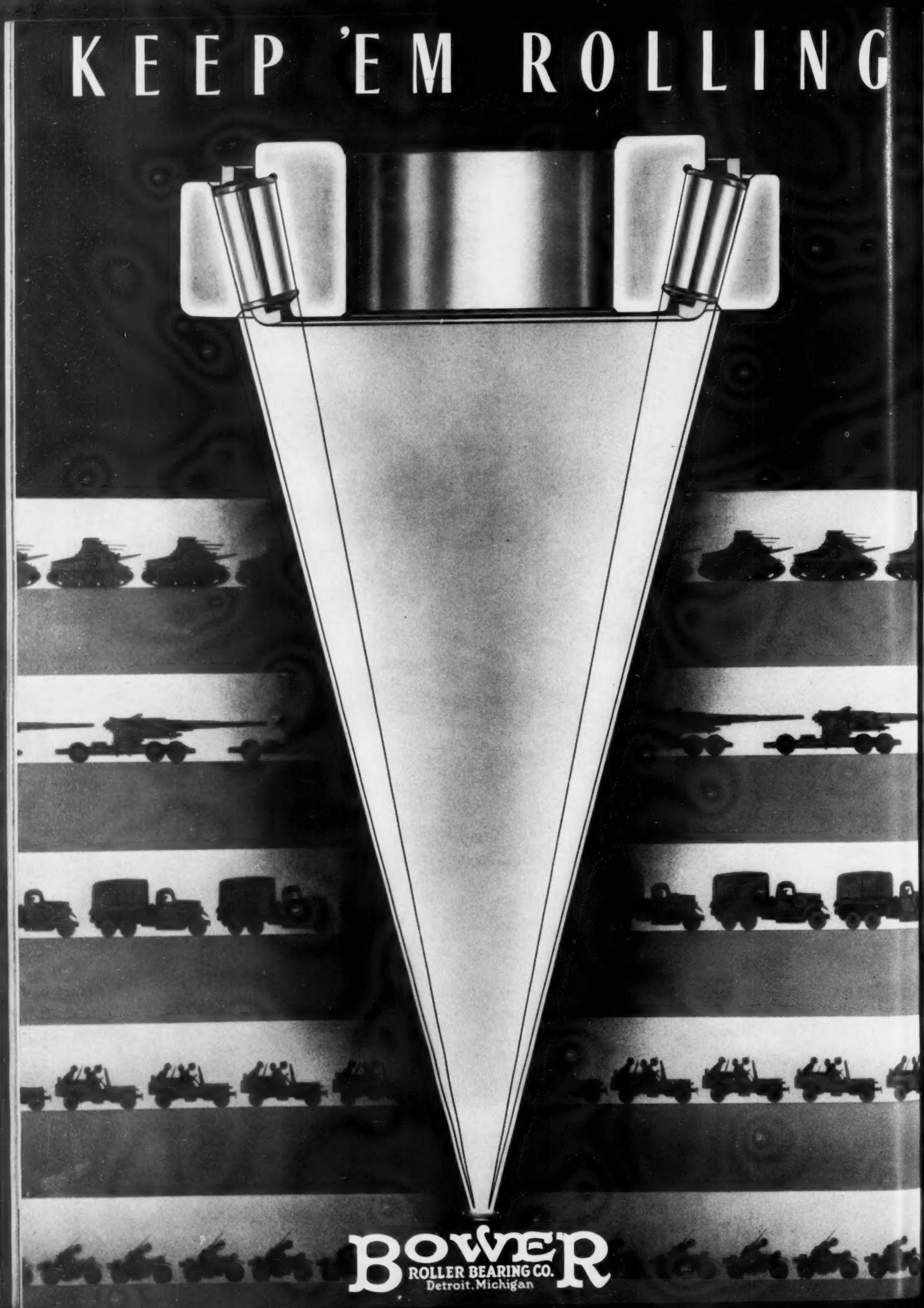
Catalog on request

B·S Brown & Sharpe Mfg. Co.

Providence, R. I., U. S. A.



BROWN & SHARPE CUTTERS


KEEP 'EM ROLLING
BOWER
ROLLER BEARING CO.
Detroit, Michigan

If You Can't Get Certain Alloys, Perhaps Others Will Do As Well

YES, some alloys are hard to get these days. But it is often possible to substitute one alloy for another or one grade for another and still obtain the same final result without materially changing steel-making practice. The desired properties in steel can often be obtained with different combinations of alloying elements.

If you make iron or steel, perhaps we can suggest what ferro-alloys you can substitute to overcome supply difficulties and how you can change your practice and still make a quality product. If you use steel, we can help you select substitute alloy steels suitable for the job. This service is backed by over 35 years' experience in the production and use of high-grade ferro-alloys, and includes a staff of competent metallurgists who are ready to give you practical, on-the-job help. Why not ask for this service whenever you need it, without obligation.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York, N. Y.

Items of Interest about "Electromet" Ferro-Alloys

•

High-Nitrogen Ferrochrome Gives Grain Refinement – High-nitrogen ferrochrome added in the furnace to produce high-chromium steels greatly refines grain size. The nitrogen introduced with the chromium develops strength and toughness without sacrificing machinability.

Columbium Prevents Intergranular Corrosion in the Austenitic Stainless Steels – A small amount of columbium in the austenitic stainless steels stabilizes the carbides and prevents intergranular corrosion even after the steel is held at temperatures ranging from 750 to 1,650 deg. F. for long periods. The columbium content should be from six to ten times the carbon content, depending on the service involved.

Use Low-Carbon Ferrochrome for Making High-Speed Tool Steels – Low-carbon ferrochrome is widely used instead of high-carbon ferrochrome for making high-speed tool steels. This practice inhibits the formation and segregation of hard chromium carbides and results in a more uniform steel.

Zirconium Improves 12 to 14 Per Cent Chromium Steels – Zirconium in the form of 35 to 40 per cent

zirconium alloy is being successfully used as a final addition to 12 to 14 per cent chromium steels. This treatment eliminates pinholes and porosity in ingots and castings.

Columbium Stabilizes Toughness of the 4 to 6 Per Cent Chromium Steels – About 0.50 per cent of columbium in the wrought 4 to 6 per cent chromium steels makes these steels retain their toughness at room and sub-zero temperatures, after being subjected to the wide variety of temperatures encountered during fabrication and service. Even at 40 deg. below zero, the columbium-bearing steels do not become brittle regardless of the previous heat-treatment.

• • •

If you want more information about these and the many other "Electromet" ferro-alloys and metals and the service that goes with their purchase, write for the booklet, "Electromet Products and Service."

Electromet
Trade-Mark
Ferro-Alloys & Metals

Available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

The word "Electromet" is a registered trade-mark of Electro Metallurgical Company.

STRIKING POWER

750 TONS OF IT

For the *pressing* needs of aviation

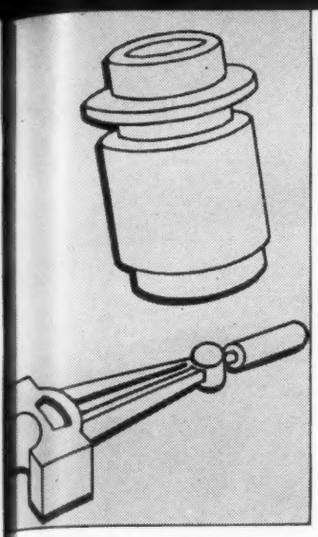
Because of their extreme accuracy, low upkeep, maximum output and compact design, Modern Cleveland Presses are particularly suited for the mass production program of the Aviation Industry.

The Press illustrated has a capacity of 750 tons, a bed area of 80" x 144", stroke 50" and 6" adjustment. All gears, flywheel and drive are completely enclosed in the box type crown and there are no overhanging brackets or other projections.

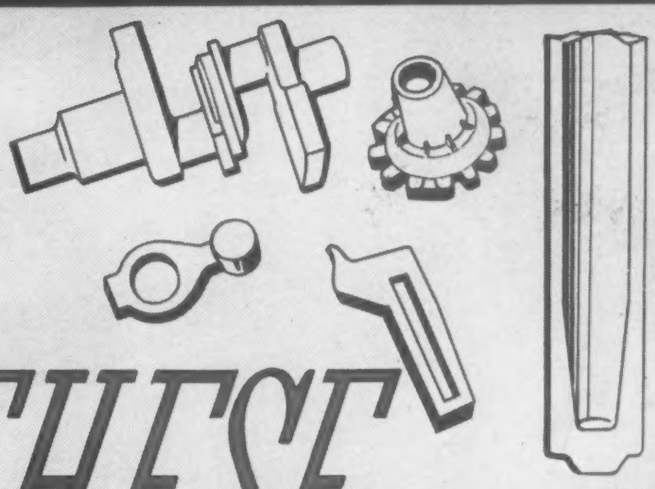
This type of Cleveland Press can be furnished in Single Point, having one connection; Two Point, having two connections and Four Point (as illustrated) having four connections, in sizes and capacities to suit requirements.

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY · · *Cleveland, O.*

COMPARE THE *low* UPKEEP OF MECHANICAL POWER PRESSES WITH THAT OF ANY OTHER TYPE



Shells . . Propellers
Hub Spiders
Gun Carriage Parts
Motor Forgings
Landing Gear Parts
Crankshafts
Aircraft Crankcases
Connecting Rods

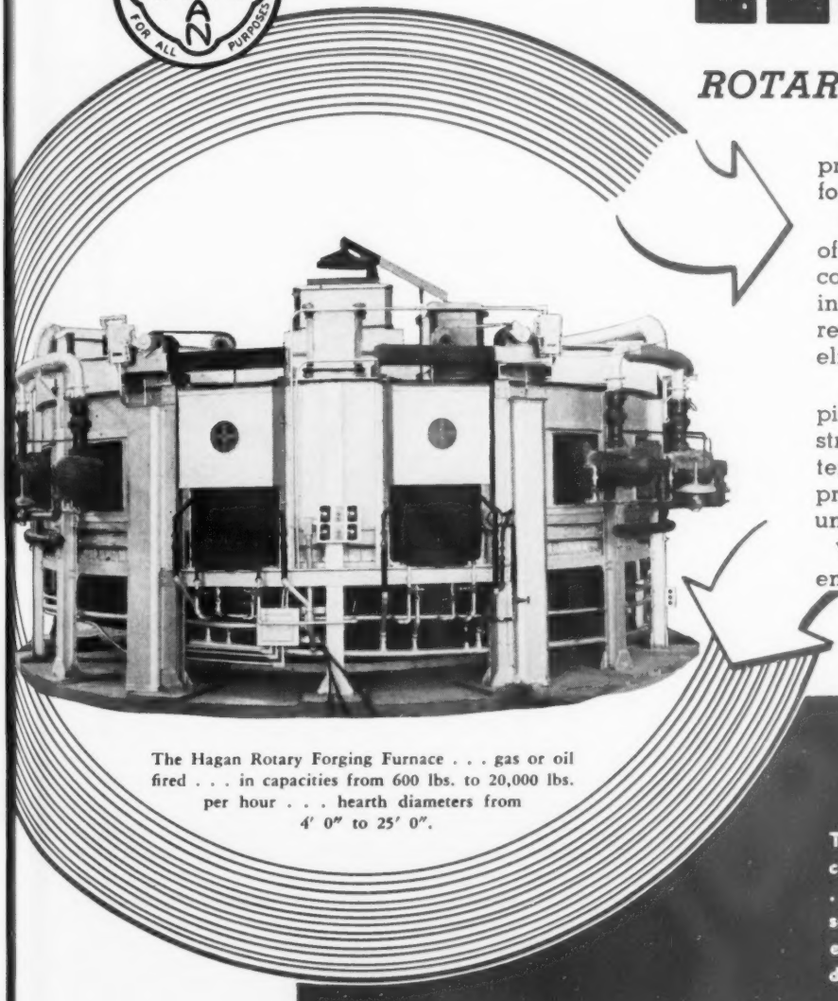


IF YOU FORGE *THESE*...

Investigate

HAGAN

ROTARY FORGING FURNACES



The Hagan Rotary Forging Furnace . . . gas or oil fired . . . in capacities from 600 lbs. to 20,000 lbs. per hour . . . hearth diameters from 4' 0" to 25' 0".

The Hagan "Rotary" assures fast, continuous production of smaller forgings and a constant uniformity that cuts rejections to a minimum.

Every billet must make a complete, timed cycle of the furnace . . . emerges thoroughly soaked and constantly within the critical forging range. Forging operations become fast and unvarying . . . rejections due to burned or cold steel are entirely eliminated . . . every billet forges the same.

Consider, too, the trouble-free, direct ring and pinion hearth-drive and the patented* hearth construction that maintains its wall clearance at all temperatures. The Hagan Rotary Forging Furnace provides every feature you need for economy, uniformity and efficient production in *your* shop.

Why not discuss your requirements with a Hagan engineer or write for our descriptive bulletin?

The Hagan Rotary Hearth principle assures timed billet heating ... controlled uniformity of heat saturation ... maximum fuel efficiency ... maximum production in minimum floor space.

THE HAGAN *CONTROLLED HEAT* PRINCIPLE

IN OUT

* . . . "ENDS TROUBLESOME HEARTH PROBLEMS", say users. The Hagan patented hearth construction permits full hearth expansion or contraction without altering the hearth seal clearance.

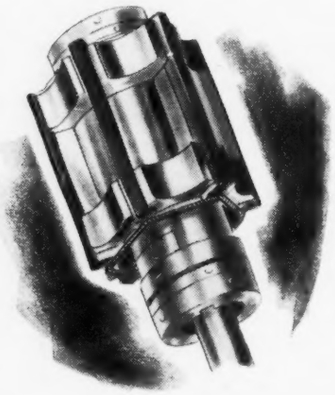
GEORGE J. HAGAN CO.

PITTSBURGH, PA.

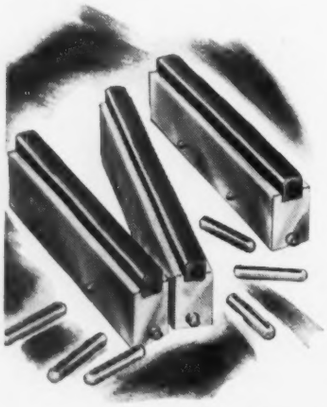
DETROIT . . . CHICAGO . . . LOS ANGELES . . . SAN FRANCISCO

How can this gun hit an enemy ship 25 miles away?

This 16 inch coast defense rifle is Uncle Sam's largest gun. To aim it accurately at a moving target 25 miles offshore requires calculations so intricate that few laymen can hope to understand them. Yet all these calculations would be discounted by the slightest imperfection in the gun's huge barrel. Consequently the bore must be brought to microscopic accuracy--and this is where Carborundum Brand Abrasives are making one of their most important contributions to defense.



This seemingly impossible job of finishing a fifty-foot gun barrel is done with a giant honing machine equipped with Carborundum Brand Abrasive Sticks. Similar hones are helping to produce engine cylinders, bearing races, fuel injection pumps, and thousands of other products requiring an accurately finished inner cylindrical surface.



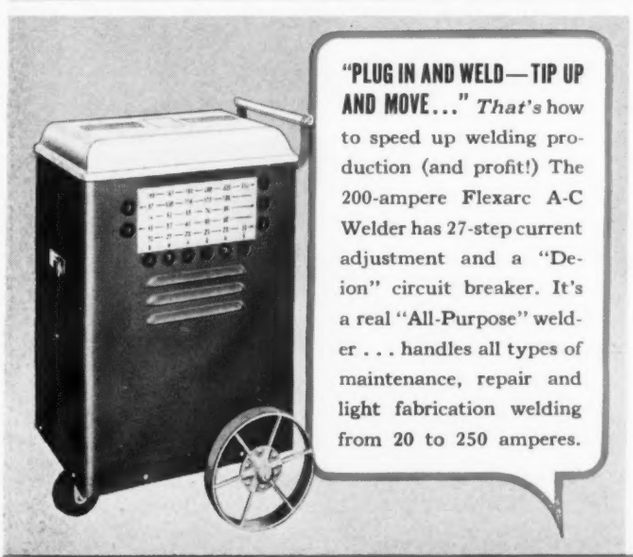
Honing is only one important abrasive process Carborundum has helped develop. Whatever your use of abrasive products, we can help you speed up production and get better results. Write The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. BRAND PAT. OFF.
ABRASIVE PRODUCTS

Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company.

"THAT'S FOR ME!" A heavy-current, heavy-duty welder that'll hold up under "hot," high-speed, continuous welding operations. It's the big 500-ampere Flexarc A-C Welder with 100 to 625-ampere current range, and built-in HIGH POWER FACTOR for thrifty operation!

"WE NEED A WELDER THAT WORKS FAST..." This compact, wheel-mounted A-C Flexarc handles all kinds of medium to heavy work. It'll give us small-welder portability and ease of operation—with big-welder capacity. 300-ampere rating . . . 60 to 375-ampere current range . . . "De-ion" circuit breaker . . . *AND* moneysaving, built-in, HIGH POWER FACTOR!



"PLUG IN AND WELD—TIP UP AND MOVE..." *That's* how to speed up welding production (and profit!) The 200-ampere Flexarc A-C Welder has 27-step current adjustment and a "De-ion" circuit breaker. It's a real "All-Purpose" welder . . . handles all types of maintenance, repair and light fabrication welding from 20 to 250 amperes.

"NOW FOR MY SHOP . . . " I need a thrifty A-C welder—economical to buy and to operate. Still, it's got to do a good sound welding job on general maintenance, repair and even light fabrication. This Flexarc Midget Marvel is the answer. 15-step current adjustment, 20 to 140 amperes . . . wheel-mounted and easily portable!

HOW TO SELECT THE RIGHT A-C WELDER *to handle your welding job*

GET THIS FREE BOOK. Latest catalog gives you job facts, ratings, capacities of the complete new line of Flexarc A-C Welders. Send for your copy today. WESTINGHOUSE ELECTRIC & MFG. CO., EAST PITTSBURGH, PA., DEPT. 7-N.

J-70352

Westinghouse

FLEXARC A-C WELDERS

Drilling barrels of machine guns. In operations like this, MO-MAX has demonstrated its superiority.

MORE TUNGSTEN *is unnecessary* LESS TUNGSTEN *is not enough*

MO-MAX

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL

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FORMULA FOR GENERAL PURPOSE

MO-MAX

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"Mohican"	Atlas Steels, Ltd.	"Rex-T-Mo"	Crucible Steel Co. of America	"S.T.M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal-Cyclops Steel Corp.
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2896

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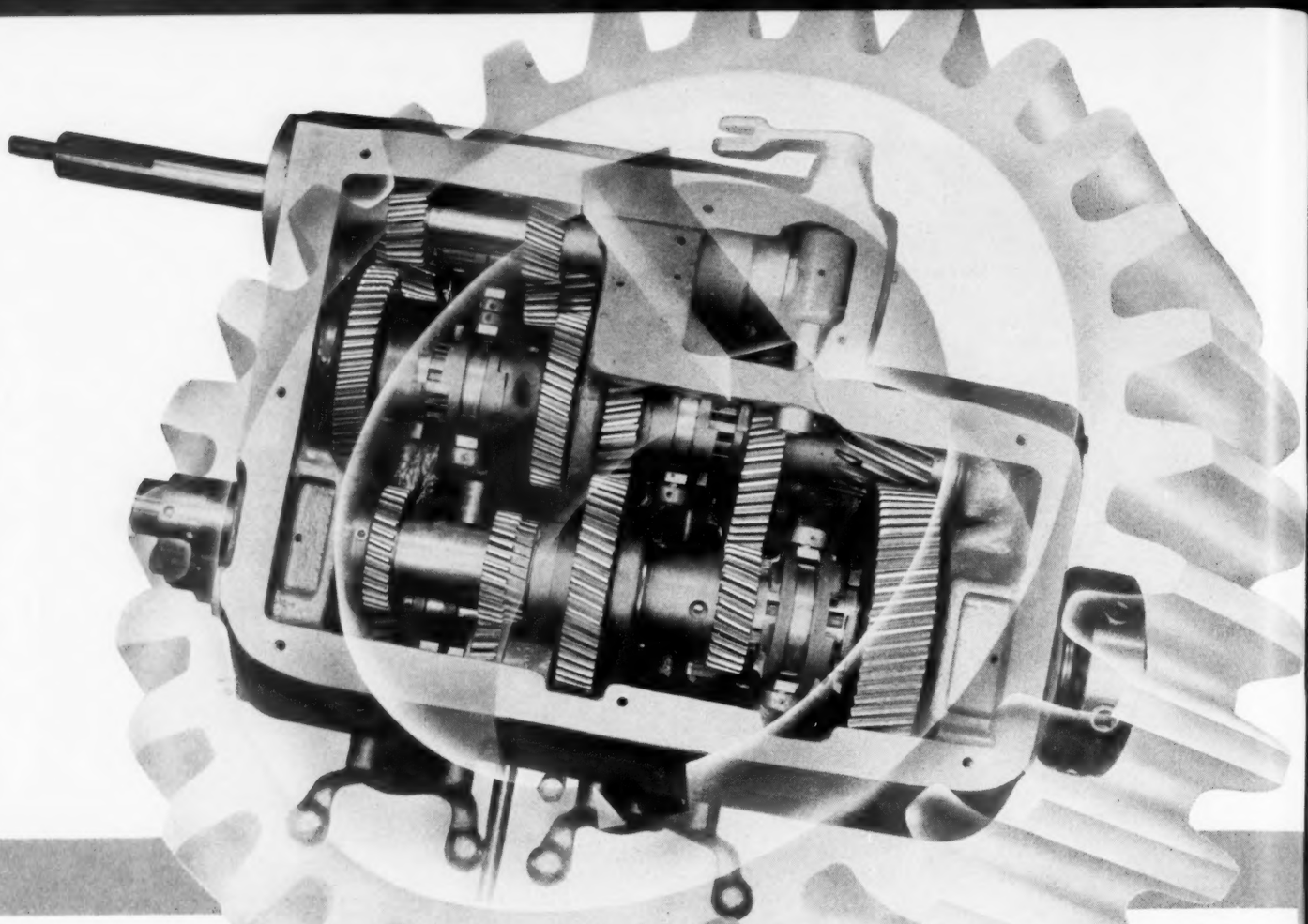

THE *Phantom Gear*

LED THE WAY TO HEADSTOCK IMPROVEMENT

IMPROVEMENTS in Monarch lathes don't just happen. They result from open-mindedness, courage to try new methods, work to carry them through. Here at Monarch, we call this urge for new accomplishments "*The Phantom Gear.*"

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* * *

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MONARCH LATHES

COVER THE TURNING FIELD

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STEEL

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PRODUCTION • PROCESSING • DISTRIBUTION • USE

He's "HEARING VOICES"

in a Plant that's Still on Paper

To convert a building full of machines into a close-knit productive enterprise, a lot of voices have to be heard from. Instructions ... requests ... information ... orders ... assurances ... consultations ... up and down, back and forth, from general manager to janitor.

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HIGHLIGHTING
THIS ISSUE OF
STEEL

■ "1942 — not 1943 — is the crucial war year for the United States," declares Donald M. Nelson. "If any of you men have war contracts pending which are being held up while you negotiate over terms or while your lawyers are ironing out details, get into production and let us settle details later," he warns **(p. 28)**. "Start turning out the stuff now!". . . . Extensive revisions in design are urged **(p. 30)** so as to free all plate mills 90-inch and wider to concentrate on war demands. . . . Criminal penalties are in store **(p. 32)** for priorities violators. . . . Small firms are to get materials **(p. 24)** under a new priority plan.

• • •

With feverish haste the problem of tin conservation is being attacked. Can manufacturers have been sharply restricted as to uses for which they may continue to furnish tin-coated containers **(p. 26)**. In the meantime, many manufacturers are ready with new types of packaging that consume no tin. . . . Vulcan Detinning Co. **(p. 27)** warns against "burning" tin off of tin cans; "burning" does not eliminate the tin but, instead, alloys it with the steel, with harmful results when the scrap is charged into open-hearth furnaces. . . . As part of the move to conserve tin, Inland Steel Co. **(p. 27)** is installing electrotinning lines and a line for bonderizing black plate; other producers are taking similar action.

Tinless Packages

• • •

Leon Henderson has full authority to ration goods sold at retail **(p. 33)**; full control over priorities and requisitioning of materials is vested in James S. Knowlson. . . . ASTM announces a list of copper and copper alloy standards **(p. 34)**; new antimony-free enamels are available. . . . Organizational details for converting the automobile industry to a full war program have been completed **(p. 37)**. . . . Dallas, Tex., **(p. 43)** is to have an iron and steel plant. . . . By charging 30 per cent sinter, output of blast furnaces is increased by 10 per cent **(p.25)**. . . . Barb wire types have been reduced in number **(p. 28)**. . . . Scrapping at auto graveyards **(p. 35)** will be expedited; the radio industry is slated for full war effort. . . . Prices on steel forgings **(p. 48)** and coated and bonded abrasives **(p. 30)** are frozen. . . . Latin American buyers will get same treatment **(p.48)** as domestic buyers.

New Copper Standards

• • •

This week J. V. Hunt relates how the Westinghouse Motor Division **(p. 54)** succeeded in increasing war production several hundred per cent largely through full-time use of automatic equipment. . . . Some welding techniques employed by Curtiss-Wright in making ammunition cases for fighter aircraft are described **(p. 60)** by George Smith. . . . Conversion of single-spindle automatics by Timken engineers **(p. 70)** increases production of bearings considerably. . . . In utilizing existing equipment, a manufacturer **(p. 74)** is using a bending press to handle progressive stamping and forming operations. . . . Robert G. Guthrie **(p. 79)** tells how tank track pins are nitrided by mass production methods.

Ammunition Cases

• • •

Some of the operations involved in blanking and forming aircraft fuselage, wings and tail surfaces from duraluminum are described **(p. 56)** by Arthur A. Schwartz. . . . W. N. Gittings **(p. 67)** explains the economical advantages of new type switchgear in hot strip mills. . . . Improved packaging **(p. 73)** in speeding up handling and shipping of radiators also has virtually eliminated damage claims. . . . A redesigned high-cycle miller **(p. 76)** is responsible for a saving of 3½ days of production time per plane at Lockheed. . . . James R. Longwell gives an enlightening account of the use of carbide dies for drawing special shapes on a large scale **(p. 80)**. . . .Among new industrial equipment **(p. 84)** a check analysis unit described makes rapid check-analyses of metals by using a newly developed form of thermocouple.

Aircraft Production

"KEY PEOPLE"— *When You Need Steel*

Ryerson's function is not only to supply your steel, but to deliver it on time. From the moment the Ryerson switchboard flashes your incoming call until the steel is laid down in your plant, a corps of helpful, intelligent employees well-trained in the Ryerson "Immediate Steel" tradition are at your service.

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RYERSON *Certified* STEELS

RYERSON CERTIFIED STEELS

Steel Producers Increase Reserves for Contingencies, Depreciation as War Measure

◆

First reports reflect sharp increase in federal taxes, which generally exceed net income . . . Earnings are 6 to 7 per cent on capital investment

◆

■ SPECIAL contingency reserves and heavier allowances for depletion and depreciation, both necessitated by war-time operations, are reflected in the first reports on steel producers' 1941 earnings.

Full-speed, full-time production has resulted in extraordinary wear on facilities and rapid depletion of minerals, making necessary increases in depreciation charges of up to 60 per cent.

Amortization of plant construction primarily for the war effort, which will be of little use in peace time, and the inevitable expense of transition to a normal economy at the end of the war are responsible for the special contingency reserves.

Based on engineering studies, these reserves are being set up now by most companies in accordance with accepted principles of good management.

Increases in federal taxes, although anticipated, were startling in amount and in comparison with net incomes. Generally they exceeded profits. One major producer's total bill for the past year was over three times net earnings.

Earnings, after taxes and other charges, were not excessive. Indicated average was between 6 and 7 per cent on capital investment. Producer holding the largest volume of war contracts netted only 6.09 on investment.

Bethlehem Steel Corp. reported that while income last year was more than 50 per cent higher than in 1940, net earnings were approximately one-third lower. Net profit for the year amounted to $34,457,796, compared with $48,677,524 in 1940. Taxes based on income amounted to $23,877,318 in 1940, while $85,300,000 was provided in 1941. Aggregate taxes paid or provided for in 1941 totaled $110,002,700, compared with $41,345,349 in 1940.

Total taxes were equivalent to $36 a share of stock. Earnings per common share were $9.35.

Building Two Ships Weekly

To amortize expenditures for emergency facilities the company in 1941 provided $12,950,000. Total provision for depletion and depreciation (including amortization) other than depreciation on certain equipment provided for through charge to operating expense was $37,054,707, compared with $24,884,254 in 1940.

These allowances, President E. G. Grace said, may be regarded as "generous" by some, but are fully justified in the light of present circumstances.

Mr. Grace said that in 1941 Bethlehem produced one third of all of the merchant ships delivered, and this year would deliver these ships at the rate of two a week, or more than 100. All will be sizable ships, averaging more than 10,000 tons each.

Reviewing the company's expansion in shipbuilding facilities, he pointed out that it had 56 ways at the close of last year, against only 20 in the summer of 1940. By the end of 1942, Bethlehem will have 76 ways.

He cited particularly the progress at Bethlehem-Fairfield plant in Baltimore. Construction was authorized in March last year, a month later the first keel was laid, and in December, the first ship was delivered. This year the schedule at that yard calls for the delivery of one ship a week, and next year, 95 ships.

As for company's naval construction, Mr. Grace said he could only speak in general terms, because of war censorship. On one program, Bethlehem has been delivering ships six to 14 months ahead of schedule, and on others is running at least 20 per cent ahead. New shipbuilding facilities are being added, with one yard for Navy work alone, which will have a monthly capacity of five ships, with the first to be delivered in April, 1943.

He declared Bethlehem had spent for government account $71,000,000 and has still to spend somewhat in excess of $150,000,000. Included are three blast furnaces — one each at Bethlehem, Sparrows Point and Lackawanna—and about 1,000,000 tons of steel capacity; finishing capacity

includes a 720,000-ton sheared plate mill at Sparrows Point. Much of the new steel capacity will be for structurals, bars and shell steel, with 300,000 tons of it on the Pacific coast.

Scrap shortage still is acute and accounts for the slight decline in current operations to 98 per cent. Eventually increased pig iron facilities will solve much of the scrap trouble, but it will be 12 to 14 months before the three new units he mentioned will be completed.

Asked concerning the recent Truman and Vincent reports on profits in the war industries, he said that so far as his company is concerned there could surely be no charge of profiteering. He thought the financial statement supported that contention conclusively. Mr. Grace remarked that the Washington reports dealt principally with the shipbuilding industry. He said Bethlehem on certain repair work had returned some money voluntarily to the government, because volume of work was heavier than anticipated and original cost estimates were thrown out of line. Bethlehem, he added, made two voluntary adjustments in price schedules on this type of work, as it became better able to appraise actual costs.

Mr. Grace revealed Bethlehem is installing two electrolytic tin plate mills, with an annual capacity of 2,500,000 boxes and said that they were expected to be in operation in about six months. Bethlehem also is installing a bonderizing unit which will provide a plate entirely satisfactory for many uses, such as dry foods, tobacco and so forth.

Tin plate production, he estimated, may be off 40 per cent from capacity, due to restrictions on tin. However, he believed black plate could be processed to largely make up the difference.

Bethlehem has as much manganese on hand as a year ago, and is therefore in a comfortable position in this respect.

Discussing labor demands for $1 a day increase, Mr. Grace presented a table which showed an increase in total payroll last quarter, as compared with the corresponding period a year ago, of 81.8 per cent; an increase in average hourly earnings of 16.6 per cent; a gain in average weekly earnings of 23.8 per cent; and an increase in cost of living of only 8.4 per cent. He added that if such an increase in wages had been in effect during the past year, it would have added $42,500,000 to the payroll.

"Frankly," he said, "we don't see any justice in the demand for an increase in wages in the general economic picture as we see it."

Exports last year amounted to 10.7 per cent on a tonnage basis, and are running around this rate at the present time. In 1940, Bethlehem's exports amounted to 27.1 per cent.

Bethlehem directors declared regular $1.75 dividend on preferred stock, payable April 1 to record Feb. 27, and $1.50 on common stock, payable March 4 to stockholders of record of Feb. 10.

U. S. Steel's Report: Income, $116,019,518; Taxes, $191,496,332

■ UNITED States Steel Corp.'s net income for 1941 amounted to $116,019,518, slightly less than the provision for federal income and excise profits taxes, $118,700,000. In 1940, net income totaled $102,211,282. Fourth quarter, 1941, earnings were $20,331,427.

Earnings in 1941, after all charges except interest on funded debt, were equal to about 7 per cent of the value of net assets and equivalent to $10.43 per common share.

Directors last week declared the regular quarterly dividend of $1.75 on preferred stock, payable Feb. 20 to record of Jan. 30, and $1 on common stock, payable March 20 to record Feb. 20.

Shipments of finished steel products during the fourth quarter showed an increase of 5 per cent over the shipments for the third quarter and of 17 per cent over the same period of 1940. Shipments for the year 1941, subject to final year-end adjustments, were 36 per cent more than the shipments for 1940. Both the fourth quarter and the annual shipment totals established all-time records.

Policy of providing for those expenses which because of the high rate of operations must be deferred until a future time, and providing as well for those contingencies arising from the transition to a peacetime basis at the end of the war has been continued. Accordingly, a reserve of $11,500,000 was set up in the fourth quarter, making a total contingencies reserve of $25,000,000 for the year. Based on engineering studies, the high rate of operation and consequent greater use of plant (which resulted in extraordinary wear and tear) necessitated increased depreciation provisions, applicable throughout the year, which were also absorbed in the fourth quarter.

Federal Shipbuilding & Dry Dock Co. earnings for that part of 1941 during which the shipyard was operated by the Navy Department are included in the fourth quarter results. The basis on which the shipyard was returned recognized that the operation had been for the account of the Federal Shipbuilding & Dry Dock Co., interest being paid on the cash advances made by the Navy Department during the period of its operation.

Net current assets of the Corporation and its subsidiaries at Dec. 31, after deducting the current dividend declarations, were $491,900,000, compared with $471,300,000 at Dec. 31, 1940.

Payrolls for 1941 totaled $601,117,053 and employment averaged 304,394, both the highest in the corporation's history. Fourth quarter payrolls amounted to $164,943,133 and employment was 320,335.

Ingot capacity at the end of the year was 30,553,100 net tons, an increase of 2.8 per cent over the preceding year and 1.5 per cent since June 30, 1941. Blast furnace capacity increased 2.8 per cent. Relatively little increase was reported in finishing capacity.

Capital expenditures during the

U. S. Steel's Fourth Quarter and 1941 Earnings

	4th Quarter	Year 1941
Operating results (Excluding items below)	$124,317,896	$435,870,420
Less provisions for social security taxes (state, federal)	6,315,998	22,855,278
Less all other taxes (except federal income, excess profits)	12,883,043	49,941,054
Earnings after above taxes	$105,118,855	$363,074,088
Less depletion, depreciation, obsolescence allowances, and amortization of emergency facilities	35,650,413	95,815,089
Operating income	$ 69,468,442	$267,258,999
Less loss in sale of capital assets (net)	(cr.) 263,610	1,507,598
Less provision for contingencies	11,500,000	25,000,000
Income before interest and federal income taxes	$ 58,232,052	$240,751,401
Interest on bonds and mortgages (incl. net discount and expense)	1,486,125	6,031,883
Income before federal income taxes	$ 56,745,927	$234,719,518
Estimated federal income and excess profits taxes	36,414,500	118,700,000
Net income	$ 20,331,427	$116,019,518

(All results stated are subject to final 1941 audit adjustments)

past year totaled $104,300,000. An unexpended balance of $183,800,000 was carried forward for property additions and replacements. Included in the current program are: Plate mill and blast furnace at Birmingham; added facilities to wire plants at Worcester, Mass., Cleveland and Chicago; electrolytic tinning facilities at Pittsburgh, Chicago and Birmingham; open hearth expansion on the West coast; and five ore carriers, one of which will be completed in July, two in August and two in September. Construction of authorized new facilities at Provo, Utah, has not yet been started.

Chairman Irving S. Olds said the Corporation's subsidiaries are comfortably supplied for this year with tin and manganese. The new tin plate units will result in a considerable saving of tin.

Bulk of the Corporation's current output, hovering around 100 per cent of capacity, represents war requirements. Indicating the difficulty of drawing a sharp distinction between war and nonwar consumption, Mr. Olds estimated 73 per cent of shipments, on a dollar basis, were for war or lease-lend uses. Likely the remaining 27 per cent also includes some business of this character, he said.

Exports in 1941 amounted to less than 9 per cent of the total, or about half the percentage exported in 1940. Questioned about exports to South America, Mr. Olds said these shipments in the fourth quarter were less than those to Europe.

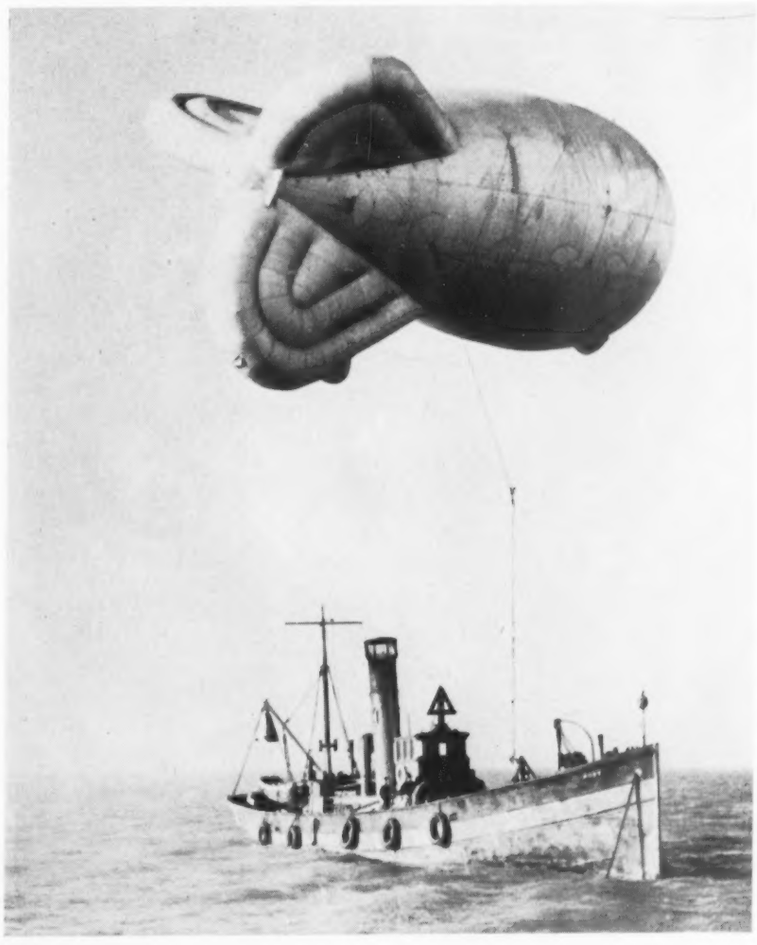
Wheeling Steel Corp. Reports Net Equals $11.71 a Share

Wheeling Steel Corp. and subsidiaries show a 1941 net profit of $8,506,304, after all charges and federal taxes. Earnings are equal after preferred dividend requirements to $11.71 a share on 569,441 common shares outstanding.

In 1940, corporation earned $5,685,848, or $6.62 on the 569,674 common shares then outstanding.

Federal, state and local taxes deducted from 1941 earnings amounted to $10,336,567, of which $7,375,925 was for federal income and excess profits taxes. In 1940, federal income and excess profits taxes amounted to $1,625,305.

Barrage Balloon Controlled from Barge



■ Barrage balloon barge, one of London's new units, hauls down balloon for refilling. The barges are fitted with living quarters for Royal Air Force personnel, and are tied up beside an operational or headquarters barge. NEA photo.

Inland Steel's 1941 Net Little Changed from 1940

Inland Steel Co.'s 1941 net totaled $14,824,053, equal to $9.08 a share on capital stock. This is substantially unchanged from the $14,450,385 earned during 1940.

Net income for 1941 is after special reserve charge of $900,000 for possible inventory price decline set up at rate of $100,000 a month during the first nine months. No charge for this purpose was made in the final quarter.

Fourth quarter net income amounted to $3,576,711, or $2.19 a share, against $3,675,724 earned in the preceding period and $4,561,901, equal to $2.80 a share, reported during the final 1940 quarter.

Provision for federal income and excess profits taxes totaled $23,283,570 last year, compared with $6,352,541 in 1940.

Company declared a dividend of $1 a share on capital stock, payable March 2 to record Feb. 13.

Rustless Iron & Steel Reports $2,332,298 Net

Preliminary net profit of Rustless Iron & Steel Corp. for year ended Dec. 31 last totaled $2,332,298, or $2.42 a common share, compared with $1,275,993, or $1.28 a share, in preceding year. Net sales were up 121 per cent, while net income gained 83 per cent, C. E. Tuttle, chairman and president, states.

December quarter profit amounted to $622,097, compared with $545,740 in preceding period.

Keystone Steel & Wire Profit $413,999 in December Quarter

Keystone Steel & Wire Co. reports December quarter net profit of $413,999, equal to 54 cents a common share, against $288,966 earned in like 1940 period.

Interlake Iron Corp. Earns $1.20 Per Share

Interlake Iron Corp., Chicago, and subsidiaries report net profit of $2,406,486 after federal income and excess profits taxes for the year ended Dec. 31. Earnings are equivalent to $1.20 a share, and compare with $829,450, or 41 cents a share, in 1940.

Resigns as Advisor

■ F. G. Steinebach, technical advisor, Foundry Equipment and Supplies Unit, War Production Board, has resigned, effective Jan. 31.

WPB Approves New Priority Plan To Give Materials Aid to Small Firms

WASHINGTON

■ SIMPLIFIED Production Requirements Plan for manufacturers whose annual volume of business is less than $100,000 was announced last week by the WPB Division of Industry Operations.

New plan, to be known as the Modified Production Requirements Plan, is designed to enable the small manufacturer engaged in war or essential civilian production more quickly and easily to obtain priority assistance to meet his needs for scarce materials over a calendar quarter.

Applications will be received immediately under the Modified Production Requirements Plan for the full three months period ending March 31. When assistance is granted, the quantities certified will be adjusted to those proper for the remainder of the quarter. At the same time, if desired, manufacturers may apply for their needs for the full quarter ending June 30. They may do this simply by filing a second application for that period along with the first one. Or, they may file this second application at a later date. Application blanks in a new form, PD-25-x, may be obtained from the Small Business Section of the Production Requirements Branch, War Production Board, in Washington, or from the branch offices of the WPB.

A small manufacturer in applying for priority assistance under this plan is required to fill out only a one-page blank. This information requested will show the nature of his products, volume of business, materials used, number of workers, etc., as shown by his customary records.

New Form Simpler and Shorter

With the application blank, the manufacturer will be furnished a list of raw materials called Materials List No. 2. This is designed to help him in describing and properly reporting the quantities of the various materials he uses and needs to procure.

Form PD-25-x on which this information is to be entered is much simpler and shorter than the Form PD-25-a which is used by larger manufacturers under the original Production Requirements Plan.

If a manufacturer is unable to supply all of the information indicated by the application form, he may nevertheless submit his application with such information as he can furnish and the application will be given full consideration.

An added and important feature of the plan is the opportunity it gives an applicant to report the power-driven equipment and machinery in his plant. A copy of the application containing this information will be given to the Division of Industry Operations, which will thus be in position to take such steps as may be possible to employ the equipment for war production. This feature is expected to bring to light a great deal of machinery in small plants throughout the United States which can be used on war orders, but which has not yet been brought into the war program.

12 Industrial Branches Broken Down Into Three Groups

Philip D. Reed, chief, Bureau of Industry Branches, WPB Division of Industry Operations, has announced that 12 of the 14 branches under his direction have been broken down into three groups, each of which will be under the immediate supervision of an assistant chief. Because of its decentralization, with an office in Detroit, the Automotive Branch will continue to report directly to Mr. Reed. The Rubber Branch will also report directly.

Amory Houghton has been named as deputy chief of the bureau, and Arthur Newhall, chief of the Rubber Branch.

Mr. Houghton has been an assistant deputy chief of the Materials Division since December.

Mr. Newhall, before going to Washington in September, 1941, served as executive vice president of Talon Inc., Meadville, Pa. Since starting service with the government, he has been deputy director of the Division of Purchases.

The plan which groups the branches under the three assistant chiefs was formulated as a measure to facilitate administration and to prevent the development of bottlenecks in the flow of work under the new organization. It will be the duty of the three supervisors to keep themselves abreast of the problems confronting the branches in their charge, and to make reports and recommendations to Mr. Reed.

R. R. Guthrie, chief of the Textiles Branch under OPM and the WPB, will continue in that capacity, and also will supervise the operations of the Food, and Electrical Supplies and Consumers' Durable Goods Branches.

W. C. Shorter, who joined the National Defense Advisory Committee in December, 1940, as assistant

Bridging a Crater at Bank of England

■ **LONDON: A temporary bridge across a huge crater outside the Bank of England (left) and Royal Exchange (in background) is being built by the Royal Engineers and Pioneer Corps, as the city continues to repair damage done by air raids. NEA photo, passed by a British censor**

director of purchases, will continue as chief of the Containers Branch, and will co-ordinate the following branches: Lumber and Building Materials, Plumbing and Heating, Health Supplies, and Safety and Technical Equipment.

John R. Kimberly, formerly president, Kimberly-Clark Corp., Neenah, Wis., who came to the OPM in November as consultant in the Industrial and Office Machinery Branch, will supervise the Industrial and Office Machinery, Pulp and Paper, Printing and Publishing, Transportation and Farm Equipment, and Communications Branches.

Advocates Wider Use of Sinter in Steelmaking

■ Increasing the hot metal charge in open-hearth practice has brought about a condition which could block the steel expansion program, warns Lewis B. Lindemuth, consulting engineer, 140 Cedar street, New York City.

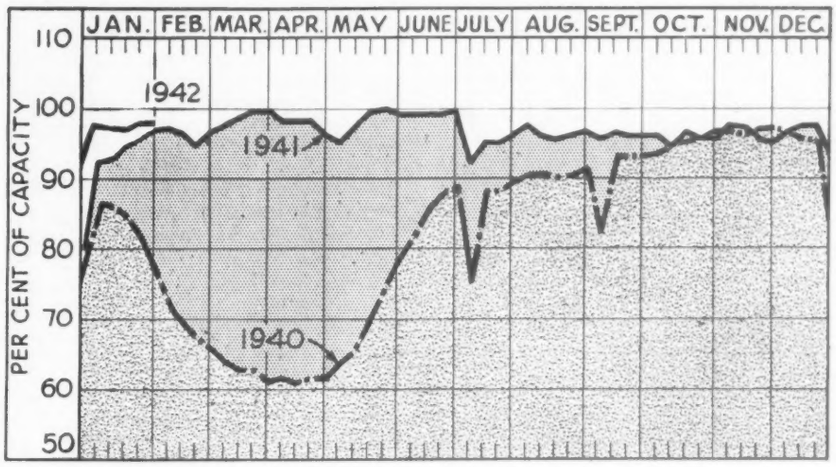
With the steel program undertaken, and with the scrap shortage becoming more acute, the percentage of hot metal in an open-hearth charge will increase rapidly, the average for the industry being over 65 per cent. It is not possible to make steel with this charge under present conditions and maintain production.

Bessemer converters are impracticable except in the larger plants, he states, and even there they deprive the open hearth of 5 per cent or more of its charge which can be maintained from the metallic iron in the ore. All iron obtained from ore in the open-hearth process is the equivalent of that obtained from scrap.

As the pig iron capacity increases and the scrap supply decreases, sinter of the hard variety is the only material available for maintaining open-hearth production, yield and cost.

Blast furnaces charging 30 per cent sinter should increase their production 10 per cent. Sinter can be obtained more quickly than blast furnaces now projected can be completed. Open hearths alone will require 10,000,000 tons of dry lump ore or sinter. The present sinter capacity of the industry is 12,000,000 tons. There is a shortage which will reach approximately 20,000,000 tons for both blast furnace and open-hearth use.

Steel can be made in existing open-hearth furnaces with hot metal up to 100 per cent of the pig and scrap charge without decreasing the production rate, Mr. Lindemuth states.



PRODUCTION . . . . Steady

■ PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was unchanged at 97 per cent of capacity. Four districts made advances, two declined and six were unchanged. A year ago the rate was 97 per cent and two years ago it was 76½ per cent, based on capacities existing at those dates.

Youngstown, O.—Gained 1 point to 87 per cent, with 68 open hearths and three bessemers active. A rise of another point is expected this week. Youngstown Sheet & Tube Co. added one open hearth. Sharon Steel Corp. has lighted its relined blast furnace.

Central eastern seaboard—Unchanged at 90 per cent in spite of tightening scrap supply.

Birmingham, Ala.—With 22 open hearths in production the rate held at 90 per cent for the fourth week.

Cincinnati—Two shifts in open-hearth operations caused a drop of 4 points to 84 per cent.

Chicago—Gained 1 point to 103 per cent, the highest since the final week of December. Some furnaces are idle for lack of scrap.

Detroit—Minor adjustments in furnace operation lowered the rate 5 points to 87 per cent. Higher iron content of the heats reduces the tonnage somewhat.

St. Louis—Slightly better scrap supply allowed one producer to light an idle open hearth, raising the rate 2 points to 78 per cent.

Buffalo—Continued at 79½ per cent, with 34 open hearths of 43 in production.

New England—Two open hearths down for repairs, the rate held at 85 per cent.

Pittsburgh—Lacking scrap, producers were unable to relight idle open hearths and the rate held at 95 per cent.

Wheeling—Advanced 7 points to 95 per cent on improved scrap supply.

Cleveland—Held at 94½ per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Jan. 31	Change	Same week 1941	Same week 1940
Pittsburgh	95	None	96.5	73
Chicago	103	+ 1	98	85.5
Eastern Pa.	90	None	96	78
Youngstown	87	+ 1	95	51
Wheeling	95	+ 7	100	82
Cleveland	94.5	None	93	75
Buffalo	79.5	None	93	60.5
Birmingham	90	None	100	90
New England	85	None	88	66
Cincinnati	84	— 4	90	64.5
St. Louis	78	+ 2	90	70
Detroit	87	— 5	92	93
Average	97	None	*97	*76.5

*Based on capacities as of those dates.

Auditorium Available for Foundry Show as Planned

■ As a result of a conference between officials of American Foundrymen's Association and the Cleveland Ordnance District, the Cleveland Public Auditorium and all exhibition halls—except lower level of underground section, which had been reserved exclusively for defense and ordnance exhibits—will be available for the Foundry Convention and Show, April 20-24, inclusive.

Some of the space planned for commercial exhibits will be used for government and ordnance exhibits, with a probability that provision can be made in the lower level of the underground exhibition hall for some ordnance exhibits as originally planned.

Canners in Convention Hear of New Ideas for Packaging To Conserve Tin

CHICAGO

■ FROM the history of the canning industry it is a foregone conclusion that it will measure up to its task in the war program. The industry did a good job in World War I. It can do a better one in this war. The defense production goals for canned foods look large and they really are large.

This was the picture as reflected by the thirty-fifth annual convention of the National Canners Association and the exhibit of the Canning Machinery and Supplies Association in the Stevens hotel, here Jan. 25-30. Despite the tremendous pressure on the industry for foods for Army, Navy and civilian use, several thousand representatives of canning and equipment industries attended the convention and exhibit.

The question of tin and tin plate supply came in for considerable discussion. Based upon research by the association, the coating of tin on tin plate has been reduced approximately 10 per cent, and it was pointed out that if the coating could be applied electrolytically it could be reduced farther.

Commenting upon this situation, Lt. Col. Paul P. Logan, assistant chief of subsistance, office of Quartermaster General, War Department, Washington, addressing the convention for the third consecutive year, said: "I look upon the tin situation as a challenge to the ingenuity of American manufacturers of metal packages and I believe that in the not far distant future they will produce a hermetically sealed metal container satisfactory for the processing of foodstuffs without use of tin. In the meantime, it becomes a responsibility of the War Department to see that tin is used by the armed forces only when and where necessary."

Developing New Packages

While the convention was in progress, the War Production Board announced its order restricting tin cans for certain less essential uses. Members of the association considered curtailment necessary, and said most manufacturers are already prepared through development of new types of packaging.

The canning industry is awaiting issuance of a government order giving a high priority rating for delivery of repair parts, replacements of worn-out machinery, and new machines and equipment for expansion of certain products. Thus far, however, canners have experienced little inconvenience along this line because the food industry has been regarded as vital and necessary materials have been made available.

One hundred and twenty manufacturers and sellers of machinery, equipment and supplies in the canning industry were represented, this number being a few more than last year.

Broad substitutions of materials in equipment construction are not yet in evidence, although this trend is expected to accelerate. Some decreased use of stainless steel was noted, principally in parts not in contact with food. Jackets for cookers, as an example, are now plain steel, whereas stainless formerly was available. Some equipment makers stated they are experiencing more difficulty in obtaining ordinary steel than stainless.

Carroll E. Lindsey, Lakeland Highlands Canning Co., Highland City, Fla., was elected president of the National Canners Association, to succeed Robert C. Paulus.

Sherlock McKewen, assistant to executive vice president, Continental Can Co. Inc., New York, was elected president, Canning Machinery and Supplies Association, to succeed John H. Eleveld, vice president, Michigan Lithograph Co., Grand Rapids, Mich. William deBack, general manager, Chisholm-Ryder Co. Inc., Niagara Falls, N. Y., was named vice president, and S. G. Gorsline, 828 Bedford road, Battle Creek, Mich., was re-elected secretary-treasurer.

Two new directors were elected as follows: Thomas Martin, sales manager, Food Machinery Corp., Hoopeston, Ill.; and George H. Tay, vice president and general manager, Lee Metal Products Co. Inc., Phillipsburg, Pa.

Lacquer-Coated Steel Containers Explored as Tin Can Substitute

Shortage of tin has intensified research for a substitute material for tin plate to be used as food containers. Among several proposed substitutes is one which is rapidly passing from the laboratory to the production stage, namely, the application of organic finishes directly to sheet steel for nonsoldered portions of many cans.

Experiments of leading can manufacturers, notable among which is the American Can Co., have indicated that lacquered containers have adequate service life for certain products, such as coffee and oil. For wet packs, however, such as corn and peas, the lacquer-coated steel container will not provide adequate life without some form of steel pretreatment.

It is pointed out that the shipping, fabrication and application of uncoated steel presents several problems not encountered with tin plate: (1) Protection from rusting during shipment and storage of sheets must be provided; (2) prevention of underfilm corrosion is necessary for coated steel sheets during warehousing and subsequent service of the can when subjected to high relative humidity and temperature; and (3) the efficiency of a lacquer-coated steel packed with wet products is dependent upon the excellency of coverage and adherence of the lacquer film to the metal base. The coating must withstand the preserving process for food which may require a cooking time as long as 190 minutes at a temperature up to 250 degrees Fahr.

Research on how these requirements can be met has disclosed that steel can be properly prepared for adequate lacquer coating if it is first given a proprietary treatment, such as bonderizing. This treatment, developed and licensed by Parker Rust Proof Co., Detroit, produces an integrally-bonded phosphate coating to black plate, and this coating provides an excellent base for the subsequent lacquer coating.

Present plans are to make only can ends from the bonderized plate. The can body will be made from tin plate and the joint soldered according to customary practice. The can-ends are fastened in by double crimping and require no soldering. There are reasons to believe that further developments may make it possible later to produce whole cans from bonderized plate.

Evidence that use of bonderized plate has arrived at the commercial stage is the fact that some steel companies are now installing bonderizing equipment.

Curtail Manufacture of Cans For Certain Products

As a preliminary step in the conservation of tin used in tin cans, WPB has telegraphed can manufacturers to curtail drastically at once their manufacture, sale, or delivery

of tin cans for the following products: Baking powder, beer, biscuits, candy and confectionery, cereals and flour, chocolate and cocoa, coffee, dog food, petroleum products, spices and condiments, and tobacco.

Order prohibits the manufacture, sale or delivery during February of this year of more than 50 per cent of the total quantity of tin plate and terne plate cans used for these same products during February of 1940.

"This is only a first step," said Walter Shorter, chief of the Containers Branch. "A general order regulating the manufacture of all tin cans is now being prepared and should be out shortly. This preliminary step is being taken to reduce at once the use of tin cans for products that can be packed in other containers."

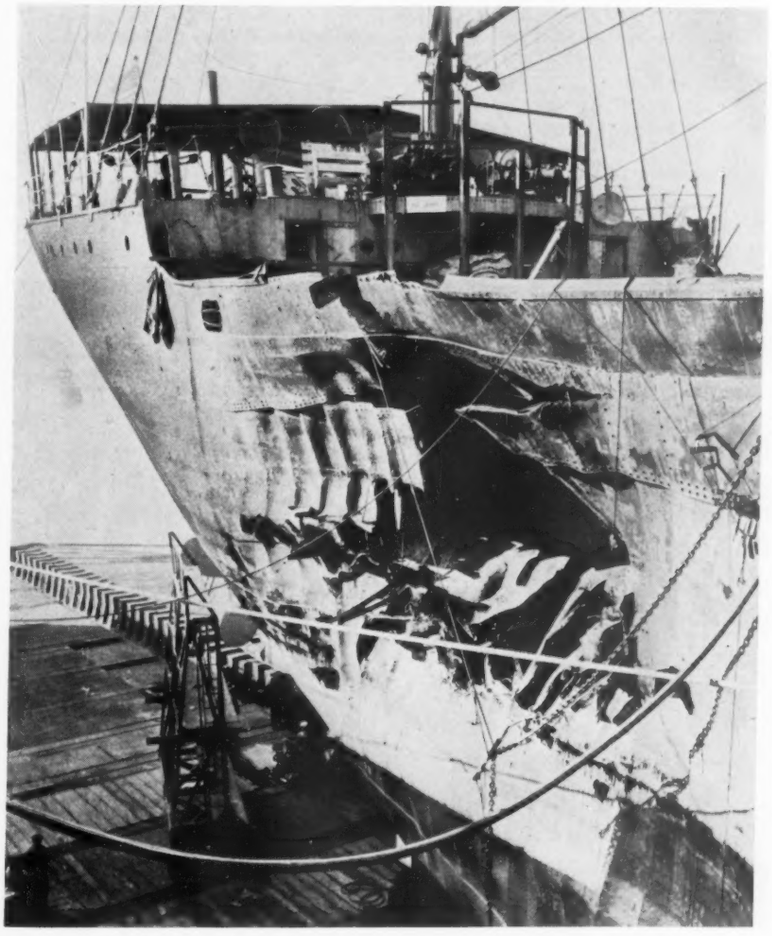
Beer, coffee and dog food are at present large users of tin cans. In 1941 beer cans alone used 1600 tons of tin, which was more than was used by any of three of the four vegetables—beans, corn and peas. Only tomatoes used more. Another 900 tons of tin went into coffee cans, 820 tons into cans for dog food, 275 tons for oil cans, and 200 tons for tobacco.

Inland Installing Two Electrolytic Lines

Construction of two electrolytic tin plating lines with an annual capacity for plating 2,000,000 base boxes of tin plate, has started at the Indiana Harbor, Ind. works of the Inland Steel Co. The work is being done largely by Inland's own organization. The first unit is scheduled to be in operation by June 1 and the second by August.

The Inland company also has placed a contract with the Wean Engineering Co., Warren, O., for a bonderizing line for black plate which is to be used by the canning industry. The bonderized plate is to be used with a protective lacquer in the fabrication of cans as a substitute for tin plate.

Torpedoed Freighter Will Sail Again



■ **Hole torn in side of the freighter ADSAROKA by a Japanese torpedo off the California coast recently. Vessel now is being repaired in an unnamed California port. NEA photo, released by United States Navy**

Warns of Results from "Burning" Tin Cans

■ Vulcan Detinning Co., Sewaren, N. J., last week sent the following letter to Walter S. Tower, president, American Iron and Steel Institute, New York:

"Of late much publicity has been given to alleged detinning tin cans by burning. . . "

As evidence of this the letter then quotes a January, 1942, issue of a business publication as saying: "In the East scrap collectors for several months have been burning tin off old cans in bonfires and sending the charred scrap to steel plants", and a New York newspaper in December, 1941, as reporting about 1600 tons monthly of scrap shipped out from 53 army camps, the cans "being burned to remove tin, solder and foreign material." The letter then proceeds:

"It is well known that tin cannot be removed by burning; it alloys with the steel. Quoting Clyde E. Williams, director, Battelle Institute: 'It is impossible to remove tin from tin plate by simple heating operation; such treatment changes the color but does not reduce the tin content. . .if present in amounts of 0.1 per cent or more, it causes serious cracking of the steel during rolling.'

"Investigations by this company show that burnt tin cans of average size retain from 1 per cent to 1¼ per cent tin.

"Detinned tin plate scrap today contains well under 0.01 per cent, including a material percentage of tin in the steel itself, *i. e.*, in the black sheet before tinning.

"It is not within our province to point out the serious and lasting results that will ensue from charging open-hearths with large tonnages of scrap containing 1 per cent to 1¼ per cent tin. But we most emphatically object to detinning, as practiced by the detinning companies, being associated with 'detinning cans by burning'."

Receives Navy Honors

■ The Navy "E" and ordnance flag were awarded last Friday afternoon to McKay Co.'s McKees Rocks, Pa., plant. Presented by Capt. F. L. Oliver, inspector of naval material in the Pittsburgh district, it was accepted by Thomas J. McKay, president.

Contribute to Navy Fund

■ Employes of Wyckoff Drawn Steel Co.'s Ambridge, Pa., and Chicago plants, awarded the Navy's "E" recently, made a generous contribution to the Navy Relief Fund in the Fourth Naval District last week.

Aircraft Program To Require 400% Increase in Workers; 260% in Plant

NEW YORK

■ Achievement of the President's program for 60,000 airplanes this year and 125,000 next year means increasing factory floor space in aircraft production from the present 50,000,000 to more than 80,000,000 square feet this year and to more than 180,000,000 feet next year, according to Col. John H. Jouett, president of the Aeronautical Chamber of Commerce, speaking before the Economic Club of New York.

Col. Jouett added that the present labor force of 400,000 must be increased to more than 700,000 within the next few months and to more than 2,000,000 next year. Dollar output will jump from 1½ billions last year to nearly 4 billions this year and 9 billions next year.

Among other things, the production of 185,000 planes in two years will call for about 555,000 engines and 50,000,000 spark plugs. Now under way is a tenfold increase on output of 4-motor bombers alone.

Cautioning about the dangers of over-expansion, Col. Jouett pointed out that after the last war the aircraft industry, geared to produce 21,000 planes a year, within three days saw all its war contracts canceled and nearly all employes laid off. Within three months the industry had been liquidated to within 10 per cent of its wartime size. As late as 1924, the entire aviation plant of the country had a net worth of less than 7 million dollars.

Newport News To Have Shipyard on James River

■ Newport News Shipbuilding & Dry Dock Co. announced last week it will construct and operate a new shipyard on the James river in Richmond, Va., in response to a request by the Navy.

Directors of the company voted to accept the undertaking and to create a subsidiary company under the laws of Virginia, to be named James River Shipbuilding Corp.

Federal Shipbuilding To Increase Facilities

■ Award of a large number of steel vessels by the Navy to Federal Shipbuilding & Dry Dock Co., Kearny, N. J., subsidiary of the United States Steel Corp., necessitates enlargement of facilities. An additional yard will be equipped in the vicinity of the present shipyard at Kearny, financed and owned by the Navy and operated by the company. Vessel production will begin during the summer. About 10,000 additional men will be required.

The Federal company has leased six tower floors in the National Newark building, 744 Broad street, Newark, N. J., and the engineering department will be removed there from its present location at 21 West street, New York. The purchasing department also will be housed there. General executive offices will remain in Kearny.

1942—Not 1943—Crucial Year, Declares Nelson

■ Donald M. Nelson, war production chief, told a large group of key American industrialists last week that "1942—not 1943—is the crucial war year for the United States." He spoke at a closed meeting arranged by the National Association of Manufacturers, Washington.

"If any of you men have war contracts pending which are being held up while you negotiate over terms, or while your lawyers are ironing out details, get into production now and let us settle details later," he said. "Start turning out the stuff now and we can argue the terms at our leisure. Turn it out by inefficient methods if necessary and figure out better methods as you get along—but get this stuff moving whatever happens!"

Aetna Standard To Build Plant Additions

■ Aetna Standard Engineering Co., Youngstown, O., will build large additions to its Warren, O., and Ellwood City, Pa., plants to help handle a greatly expanded war business, according to Ernest E. Swartswelter, president.

Additions will enable company to add about 600 more workmen, chiefly skilled machinists. Work will start immediately and plants are scheduled to be in operation by June.

Company's unfilled orders total more than $13,000,000.

1941 Scrap Consumption Reached 53,623,000 Tons

■ Institute of Scrap Iron and Steel Inc., Washington, announces scrap consumption in December, 1941, was 4,634,000 tons gross, of which the scrap industry supplied 46 per cent. For the entire year consumption is reported as 53,623,000 tons, compared with 41,687,000 tons in 1940 and 32,434,000 tons in 1939.

Ring of German Metal Returned—Air Mail

■ **Finger ring made from a German incendiary bomb was tossed into an open-hearth furnace at the John A. Roebling's Sons Co., Trenton, N. J., plant "to return it to the Axis powers by the fastest means of transportation known." The occasion was the presentation of the Navy "E" pennant and Bureau of Ordnance flag to the Roebling Co. Jan. 22. Melt of steel into which the ring was thrown by Lieut. Commander Warren A. Shaw, U. S. N. Bureau of Ordnance, who made the award, will be used in the manufacture of aircraft control cords and cables**

REVISIONS AND ADDITIONS TO

PRIORITIES—ALLOCATIONS PRICES

as published in Section Two of STEEL of Jan. 12, 1942

"M" ORDERS

M-1-e: Aluminum, effective Jan. 23, 1942. Prohibits use of aluminum except on war contracts and for manufacture of following: Anhydrous aluminum chloride for manufacture of dyes for war textiles, high octane gasoline, tear gas, nylon or pharmaceuticals; deoxidizer or alloying agent in steel manufacture, limited to .03 of 1 per cent by weight of amount of carbon steel and .1 of 1 per cent by weight of amount of alloy steel produced, and in case of deep drawing steel to .1 of 1 per cent of any such steel produced; chemical processing equipment for use in manufacturing plants where other material impracticable; commercial aircraft with A-10 rating or higher; containers for intravenous solutions and blood; radio condensers for replacement purposes; match plates, patterns and snap flasks used to fill orders with rating higher than A-2; orthopedic equipment requiring light weight; pistons for engines of heavy trucks, heavy duty tractors, diesel engines, and engines in portable fire-fighting equipment; repair and maintenance parts for mechanical or electrical equipment; welding rods; X-ray tube housings; thermit reaction; zinc base alloy, limited to 2 per cent by weight of amount of alloy produced; other alloys, limited to 12 per cent by weight of amount of alloys produced. Aluminum authorized by Priorities Director between Oct. 31, 1941 and Jan. 23, 1942 may be used for purpose specified.

M-9-c-1: Copper, effective Jan. 23, 1942. Effective March 31, 1942, use of copper in manufacture of shoe findings (eyelets, hooks, etc.) prohibited. From Jan. 1 to March 31, manufacture of shoe findings limited to number required, including sets, to fill orders specifying delivery by April 1. Copper use in that period limited to 50 per cent of amount consumed in 1940 fourth quarter, or 12½ per cent of total 1940 consumption or 35 per cent of consumption between July 1 and Sept. 30, 1941, plus requirements to fill war contracts.

M-15-b (Amended): **Rubber,** effective Feb. 1, 1942. Prohibits transfer of crude rubber or latex without permission of WPB or Rubber Reserve Co. Except to fill war orders, monthly rubber use in making various products restricted to certain percentages of average monthly consumption in year ended March 31, 1941. Includes among others: Essential heavy industry belting, hose and packings, 140 per cent; fire and mill hose, 180 per cent; industrial protective clothing, 100 per cent; plumbers supplies, 80 per cent; tire repair materials, 100 per cent. Percentages for latex consumption include: Industrial V belts and belting, 120 per cent; electricians' and industrial gloves (without fabric), 100 per cent. All uses not specifically mentioned are prohibited.

M-30 (Amendment): **Ethyl Alcohol,** effective Jan. 22, 1942. Restrictions on receipts changed from monthly periods to calendar quarterly periods. Restrictions on producer's deliveries rescinded. Certain orders, including those with A-1-j rating or higher, may be filled without reference to quantity limitations.

M-44 (Amendment): **Titanium Pigments,** effective Feb. 1, 1942. Percentage of titanium to be set aside by producers for direct allocation by Division of Industry Operations increased from 20 to 25 per cent.

M-71 (Amendment): **Fats and Oils,** effective Jan. 24, 1942. Eliminates three-months' inventory restriction, substitutes restriction on processing. Processor free to use fats and oils to fill contracts until WPB or Priorities Director directs otherwise, but production limited to order needs and minimum inventory.

M-78: Mercury, effective Jan. 23, 1942. For following purposes use of mercury in period Jan. 15 to March 31, 1942 limited to 50 per cent of consumption in corresponding 1940 period or first quarter of 1941: Carroting of hat fur; marine anti-fouling paint; thermometers (except industrial and scientific); treating of green lumber (except Sitka spruce); turf fungicides; vermilion; wall switches for nonindustrial use; wood preservation. Use for these purposes prohibited entirely starting April 1, 1942. For following purposes quarterly mercury use limited to amount consumed in base period: Fluorescent lamps; health supplies; mercuric fulminate for ammunition; industrial and scientific thermometers. Use of mercuric fulminate for commercial blasting caps limited to 125 per cent of base period.

M-82: Hemp Seed, effective Jan. 23, 1942. Prohibits use of domestically produced hemp seed for any purpose except growing of hemp fibre or additional hemp seed. Seed may be sold only to Department of Agriculture or to persons with rating of B-1 engaged in growing hemp.

"P" ORDERS

P-89: Chemical Production, effective Jan. 23, 1942. Assigns A-1-a rating to producer of material for repair in event of actual breakdown of plant; A-1-c for repair material up to minimum required to avert breakdowns; A-3 for other material for repair, maintenance or operation; A-3 for material delivered to a supplier or sub-supplier. Rating may be used only after serial number has been assigned by Chemicals Branch to producer upon application. Ratio of materials inventory to current operations must not exceed average of 1938, 1939 and 1940.

P-101: Bookbinding Wire, effective Jan. 24, 1942. Assigns A-8 rating to materials for manufacture of flat steel wire used for binding processes in printing industry, excluding pre-formed staple, box stay and specialty binding wire. Can be used only for materials authorized by Priorities Director upon submission of Form PD-82.

"L" ORDERS

L-1-a (Amendment): **Medium and Heavy Motor Trucks,** effective Jan. 23, 1942. March production quota set at 54,710 units, compared with output year ago of 40,802. May not be equipped with tire casings or tubes. Permits unlimited production of passenger carriers during March.

L-28: Incandescent Lamps, effective Jan. 24, 1942. Starting Feb. 1, 1942, use of materials obtained on preference rating prohibited in making lamps for decorative or advertising purposes, and quarterly consumption of nickel, brass, copper or other such metal must be cut 50 per cent below average quarterly use in 1940. In making all types of lamps consumption of nickel must be cut 25 per cent, brass and copper 20 per cent from 1940 average.

L-44: Radio Receivers and Phonographs, effective Jan. 23, 1942. Monthly production during 90 days after effective date cut 45 per cent below monthly average during nine months ended Sept. 30, 1941 for manufacturers who sold more than $1,000,000 worth of sets for civilian use in first nine months of 1941, 35 per cent for smaller firms.

PRICE SCHEDULES

No. 76—Hide Glue, effective Jan 28, 1942.

No. 77—Beehive Furnace Coke, effective Jan. 26, 1942. Maximum for this grade produced in Pennsylvania is $6 per net ton, f.o.b. cars ovens, Connellsville, Pa. Does not apply to foundry coke.

No. 78—Oxalic acid, effective Feb. 2, 1942. Maximum prices for carlots in cents per lb., f.o.b. producer's shipping point, for crystalline oxalic acid, 11¼ in containers of more than 290 lbs., 11¾ in containers of 100-290 lbs. Powdered acid 1 cent higher.

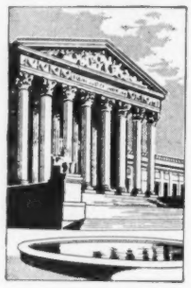
No. 79—Carbon tetrachloride, effective Feb. 2, 1942.

No. 80—Lithopone, effective Feb. 2, 1942. Maximum prices in cents per lb. delivered in bags in carlots in New Mexico, Colorado, Wyoming, Montana and eastern states: Normal 4.25; high strength barium and high-strength calcium 5.60; high strength magnesium 5.75; titanated 5.60; zinc sulphide 8.25. Add ¼-cent for less carlots. Prices other states ¼-cent above eastern territory.

For additional revisions and additions please see STEEL of Jan. 19, p. 30, and Jan. 26, p. 31.

Windows of *WASHINGTON*

Redesign of strip mills recommended to take pressure off sheared plate mills . . . Agreement provides for round-the-clock operation of West coast shipyards . . . Data on vacant industrial buildings sought . . . Leon Henderson granted authority to ration all articles sold at retail . . . J. S. Knowlson given full power to administer priorities . . . A-8 rating assigned to stitching wire materials



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ WARNING that unless pressure was eased on sheared plate mills by industries able to utilize other plate, serious effect on the nation's war effort would result, was sounded by Stanley Adams, chief, Allocations Section, Iron and Steel Branch, WPB, following a week-long conference of plate producers.

The conference indicated output will total 950,000 tons of steel plates per month divided as follows: 350,000 to 400,000 sheared; 150,000 universal; 400,000 continuous strip.

An immediate problem exists to relieve the sheared plate mills for direct war effort. "That is where the bottleneck is," said Adams. He explained one object is to persuade industries using sheared plate to redesign, wherever possible, in order to use plate from strip mills. Adams furnished an analysis of strip mill possibilities showing 22 to 25 strip mills are making sizes 10 up to 72 inches, including three of that number which can make up to 90 inches. Only 11 strip mills can roll plates over three-quarters of an inch thick, leaving a dozen or more strip mills unable to produce up to 72 inches.

The big problem is size, not use, Adams said.

"We have and have had when the war started a fixed capacity for plates over 90 inches. If we are to get more plates of those dimensions it means building new mills." He added that if everybody using plates who can shift from 90-inch to smaller sizes will shift, it will ease the strain. He suggested strip mills formerly producing for the auto industry can change over and some roll plates over 90 inches.

Referring to a letter to industry signed by C. E. Adams, chief, Iron and Steel Branch, asking industry's co-operation in using strip mill plates, Stanley Adams suggested "thousands can if they want to," and named shipbuilding on commercial vessels, railroads, storage tanks, electrical transformers. He said he has a representative working in the Maritime Commission on the problem and with the Navy with good prospects; also the railroads already have ordered on their own initiative use of 72-inch plates where possible.

Strip mills listed in C. E. Adams' letter included American Rolling Mill Co. 80 inches, Middletown, O., mill and 58, Ashland; Bethlehem Steel Co. 56, Sparrows Point and 79 Lackawanna; Carnegie-Illinois Steel Corp. up to 80; Great Lakes Steel Corp. up to 96; Inland Steel Co. up to 76; Jones & Laughlin Steel Corp. 96; Otis Steel Co. up to 77; Republic Steel Corp. up to 98; Wheeling Steel Corp. 60; Youngstown Sheet & Tube Co. up to 79.

Continuous Operation of West Coast Shipbuilding Assured

Details of an agreement for around-the-clock, seven-day week shipbuilding operation on the Pacific coast were unanimously ratified by unions and shipyard owners last week, Sidney Hillman, WPB labor director, announced. Union memberships have agreed to forego double-time pay for Sunday work.

Agreement was worked out by the WPB Labor Division's shipbuilding stabilization committee, made up of representatives of labor, management and government. It provides for six-day staggered shifts with time-and-a-half pay for the sixth day. Under the new pact, double time will be paid to an employe only when he is required to work a seventh day whether Sunday or any other day. Previously all Sunday work required double time pay regardless of the number of days worked in the week.

Steps are being taken to obtain adoption of the same terms for the Atlantic, Gulf and Great Lakes zones, which also are operating under the shipbuilding stabilization committee agreement.

Heads Purchasing Division

Douglas MacKeachie
Who heads the Purchases Division in the streamlined War Production Board. Mr. MacKeachie, formerly a purchasing executive with the Atlantic & Pacific Tea Co., has been associated with the National Defense Advisory Commission and the Office of Production Management. For sketches of other members of the board see STEEL, Jan. 26, p. 25

Coated, Bonded Abrasives Price Maintenance Asked

Manufacturers of coated abrasive products and bonded abrasive products have been asked by OPA not to publish, quote prices on, nor sell output at prices above those in effect Oct. 1.

In the event any manufacturer considers it necessary to increase prices over those in effect Oct. 1, OPA requests that it be notified one month in advance of the date upon which the intended increase would take effect. Should a manufacturer submit such proposed price rise, he is requested at the same time to forward a detailed factual statement of reasons believed by him to justify proposed increases, including financial data.

Coated abrasives include sand-

CASE "A"

Reduction of 64% in man hours in one single operation

CASE "B"

Increase from 20 to 80 tons of steel handled in one day

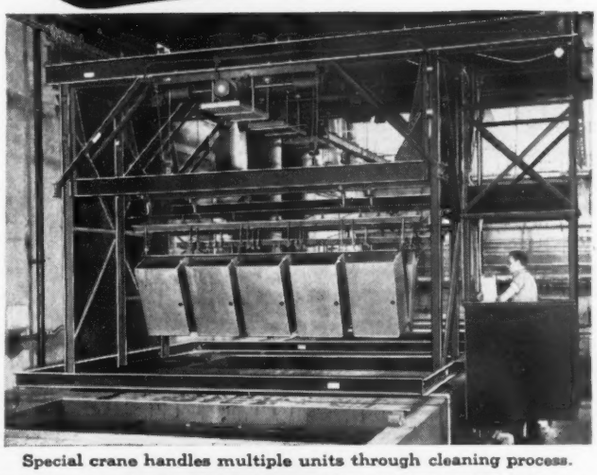
CASE "C"

Production increased 30%

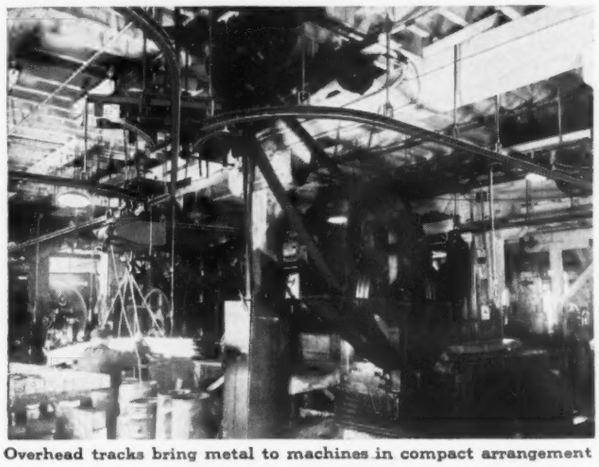
HOW'S THIS FOR *Stepping Up* PRODUCTION?

YOU, too, can accelerate your rate of production as rapidly as you release man-power from handling labor. Any mechanical means of lifting and carrying even light loads reduces fatigue and thereby makes possible a greater output per man.

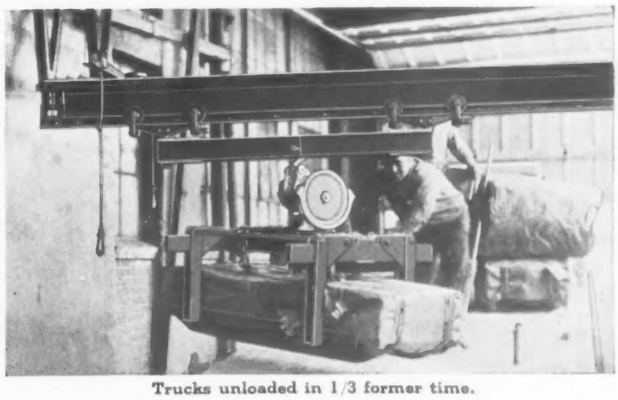
This is only one of many advantages gained with American MonoRail Handling Systems . . . to mention a few others — reduction in idle machine time, more compact arrangement of machinery and equipment, congested operating conditions overcome, and waste space converted into profitable space. BUT STEP UP PRODUCTION YOU MUST. Let an American MonoRail engineer show you how it can be done in your plant. American MonoRail equipment is engineered to meet the particular requirements of each problem. There is no delay or shut down during installation.



Special crane handles multiple units through cleaning process.



Overhead tracks bring metal to machines in compact arrangement



Trucks unloaded in 1/3 former time.

THE AMERICAN MONORAIL CO.

13102 ATHENS AVENUE CLEVELAND, OHIO

paper, garnet paper, flint cloth, aluminous oxide cloth. Their part in the war effort includes use in finishing aircraft engine parts, air frames, hard metals, and cutting and finishing leather and leather products. Coated abrasive product prices advanced on the average from 6 per cent to 10 per cent in November-December, 1941, the first advance since 1937. The price rise is being investigated, and until full details for this rise are forthcoming, it has been determined that the previously existing price level should not be exceeded.

Bonded abrasives, including grinding wheels, honing sticks and sharpening stone, are important in armament production, and are essential to the manufacture of airplanes, tanks, etc. Grinding wheels are essential to repair of combat vehicles and aircraft in the field, since interchangeability of parts and close tolerances would not be possible without their use. No significant change in bonded abrasive product prices has been reported in the past year.

Curtail Nonferrous Metal Uses in Nonessential Lamps

Sharp reduction in the use of nickel, copper and brass in the manufacture of nonessential incandescent lamps for advertising decoration and display purposes has been ordered by WPB. Consumption through April is limited to 50 per cent of that used in comparable 1940 period.

Use of these metals in lamp manufacture generally also has been curtailed under Limitation Order L-28. Consumption of nickel is reduced by 25 per cent below 1940; brass by 20 per cent; and copper by 20 per cent. Savings are estimated at 221,000 pounds of nickel, 2,874,000 pounds of brass and 295,000 pounds of copper.

A-8 Rating Assigned for Bookbinding Wire Materials

An A-8 preference rating has been made available by the WPB for delivery of materials for the manufacture of stitching and bookbinders wire, essential to the printing and publishing industry.

Producers are entitled to apply the rating to obtain delivery of the steel rods necessary to make stitching wire. The rating can be applied only for materials authorized on Form PD-82. WPB will determine these requirements on a quarterly basis, and it is expected that for the first quarter, a reduction of from 10 to 12 per cent from normal current usage of steel will be required.

Restrictions on use of steel in succeeding quarters may be greater because of the increasing military demands.

The preference rating, applying only to round or flat steel wire used in the binding processes employed in the printing, publishing and related service industries, was assigned under Preference Rating Order P-101.

Propose Criminal Penalties For Priorities Violations

Legislation providing criminal penalties for violators of priority regulations and granting sweeping new war controls to the government was approved by the Senate last week and sent to the House of Representatives.

The measure provides:

Punishment of violations of priority orders by a $10,000 fine, imprisonment of not more than one year, or both.

Allocation of production facilities, tools and equipment by the President to provide for the maximum use of industrial capacity in the war effort.

Authority for seizure of personal property located on or used with real property acquired by the government, and for the taking over of machinery even if in use. Government would be empowered to dispose of property thus seized.

Authority for the Interstate Commerce Commission to exercise the same powers over motor carriers as now are exercised over railroads.

Seek Data on Vacant Industrial Buildings

Formation of an Industrial Building Utilization Section of the Plant Site Board was announced last week by Douglas C. MacKeachie, director, WPB Division of Purchases. Frederick A. Kimmich, Detroit industrial engineer, has been placed in charge.

Functions of the section will be to collect all information on available vacant industrial buildings and make this information available to the procurement divisions of the Army and Navy, so that they may co-operate with the Plant Site Board in placing contracts for the manufacture of war materials in such a way that these buildings will be utilized.

This will accomplish two purposes: (1) Because the building is already erected, production can start immediately or at least within a relatively short time; (2) a large amount of essential war materials that would be needed for a new structure will be saved for war purposes.

Mr. Kimmich asked that owners of usable vacant factory buildings

Western Hemisphere Unites Against Axis

■ Delegates to the conference of American foreign ministers at Rio De Janeiro, Brazil, listen intently as Eduardo Anze Matienzo, foreign minister of Bolivia, standing at left, reads the final agreement for a common stand against the Axis. Pact represents culmination of two weeks' negotiations, is considered a victory for United States diplomacy. NEA photo

mail to the Plant Site Board, Social Security Building, Washington, information as to land area, floor area and particulars regarding their plants.

Leon Henderson Granted Full Authority as Rationing Chief

Full authority to ration all goods and commodities sold on the retail market and any products sold to ultimate consumers for the satisfaction of personal needs has been vested in OPA in a directive issued by War Production Chief Donald M. Nelson, and approved by President Roosevelt.

Order vesting rationing power over consumers' goods in the OPA, headed by Leon Henderson, says that the OPA may exercise the existing rationing power over:

1. The sale of products by any person who sells at retail.

2. The sale of products by any person to an ultimate consumer acquiring the products for the satisfaction of personal needs, as distinct from business or industrial needs.

The delegation of authority marks a further step in the preparation for rationing of consumers' products. Critical shortages exist in many basic raw materials which are more important in war production than in ordinary civilian channels. Tires are already being rationed, and preparations are being worked out to ration automobiles and sugar.

Further rationing seems inevitable, and, so far as the civilian population is concerned in its ordinary purchases for personal requirements, the order gives full control to the OPA, although the chairman of WPB reserves the right to amend the delegation.

The order cuts a clear line between civilian rationing for personal needs and the allocation or rationing of goods for war purposes. While the OPA will operate in the civilian field, the order specifically states that the authority delegated does not permit the OPA to control acquisition of products for war agencies, including the armed services, or government agencies or other persons acquiring products for export to foreign countries.

Allocation of materials and other supplies for war production will be administered as usual within the WPB under the existing priorities system.

Knowlson Given Full Power To Administer Priorities

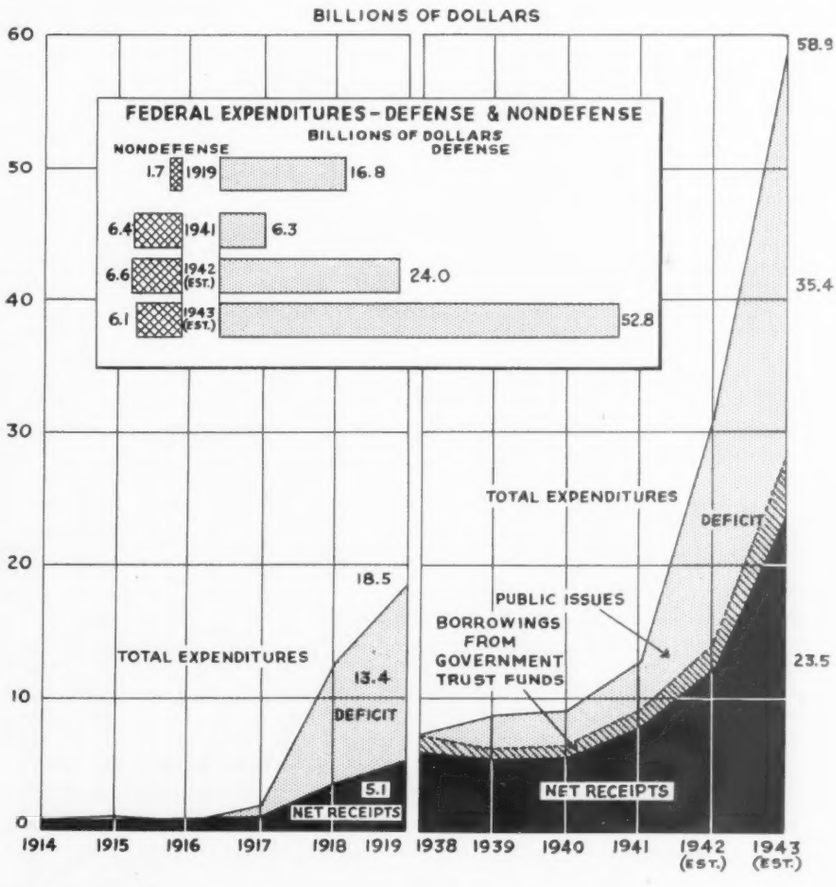
Authority to operate the priorities system and to administer regulations under requisitioning acts was officially vested in James S. Knowlson, director of the Division of Industry Operations, by Regulations Nos. 1 and 2 of the WPB, issued last week by Donald M. Nelson, WPB chairman.

The regulations delegate to the director of Industry Operations the powers conferred upon the chairman of the WPB by executive order 9040. The executive order abolished the Office of Production Management and transferred to the chairman of the WPB the powers and functions previously exercised by OPM and by SPAB.

Authority delegated to the director of Industry Operations includes power to issue priority orders and regulations; to compel the acceptance of war orders by producers and manufacturers; to requisition the property of any person or firm which is needed for the war effort, in accordance with federal statutes; and to approve requisitions of other federal agencies.

Powers conferred upon the director of Industry Operations may be further delegated by him to any officials he may designate in the Division of Industry Operations or to other designated government officials including contracting and procurement officers of the War and Navy departments.

In making public the new regulations, Knowlson announced that the official title of C. H. Matthiessen Jr., who was appointed recently to take charge of the priorities system, will be chief of the Bureau of Priorities in the Division of Industry Operations.



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War's Wages Also Higher

■ Advance in the cost of making war has been no less spectacular than the manner in which it is waged. Accompanying chart, prepared from data by the National Industrial Conference Board, New York, compares federal receipts and expenditures for the fiscal years, 1914-19 and 1938-43 and breaks down expenditures into war and nonwar disbursements.

In the chart, "total expenditures" exclude public debt retirement. "Net receipts" include all receipts other than those from the sale of government obligations, except that transfers to the federal old age and survivors insurance trust fund have been deducted. "Defense expenditures" include Army, Navy, lend-lease, loans to Allies (in World War I), Shipping Board, Maritime Commission, and other defense activities. "Borrowings from government trust funds" consist principally of social security trust funds invested in government obligations. "Public issues" are those sold to the public.

Copper and Copper Alloys Standards Compilation Issued by A.S.T.M.

■ AMERICAN Society for Testing Materials has issued a new publication, *A. S. T. M. Standards on Copper and Copper Alloys.* It provides in convenient form for ready reference the various specifications and tests issued by the society covering copper and copper base products.

The compilation sponsored by Committee B-5 on copper and copper alloys, cast and wrought, also includes specifications developed by Committee B-1 on copper and copper alloy wires for electrical conductors and selected specifications prepared by Committee B-2 on nonferrous metals. There are some 73 standards covering a wide range of important products, many of which are essential in the present national emergency program.

Adjustments Committee B-5 has been active in co-operating with service branches of the government in order that adjustments might be made to bring specification provisions into substantial agreement. This has had the valuable result of making it possible to divert important products from regular commercial production to the emergency program.

Cover Various Products

Twelve specifications cover various types of wire and cable for electrical conductors. Eight give important requirements for various types of nonferrous metals such as electrolytic copper, fire-refined copper, slab zinc, pig lead, nickel, lead-coated copper sheets, and a proposed draft covering oxygen-free electrolytic copper wire bars, billets, and cakes.

Sixteen standards cover various types of plates, sheet, and strip, including cartridge brass, gilding metal, gilding metal bullet jacket cups, bridge bearing and expansion plates, phosphor bronze, beryllium-copper material and muntz metal.

The field of wire rods, bars and shapes (not electrical conductors) is covered by 15 specifications. There are nine for various types of pipe and tubes—copper and brass boiler tubes, standard pipe, copper seamless tubes and water tubes. The 16 specifications for copper, base alloys for sand castings include the important classifications of cast copper base alloys.

Among the standard tests are the new expansion (pin test) test for tubing and the mercurous nitrate test for copper alloys. Also given are the standard tension and hardness tests and the extensive methods of preparing micrographs of metals and alloys, with the insert plate showing grain size standards.

Copies of the 350-page publication in heavy paper cover can be obtained from the American Society for Testing Materials, 260 South Broad street, Philadelphia.

Limit Use of Mercury in Nonessential Products

Limitations on the use of mercury in nonessential products have been imposed by Order M-78, issued last week by WPB. Consumption is cut to 50 per cent of amount used in similar 1941 period up to March 31, after which its use is prohibited.

Order permits full supplies, and increased amounts in some cases, for certain industrial uses, including: Ammunition, blasting caps, fluorescent lamps, health supplies, industrial and scientific thermometers.

Persons working on contracts with a preference rating lower than A-1-j will be limited to 80 per cent of consumption in an optional base period of 1940 or 1941. Excepted are government contracts and in those cases where it is necessary to comply with underwriters' specifications.

Antimony-Free Enamels Release War Materials

■ Vital defense materials are being released through wide-spread adoption of antimony-free porcelain enamels, according to the Porcelain Enamel & Mfg. Co., Baltimore. Company says range, refrigerator and other manufacturers report they have reduced the amount of opacifier used from 3 to 1 per cent, that 15 per less enamel is used, burning time is shortened, reducing amount of fuel consumed, and that production has been increased without additional equipment.

War Subjects Eligible For Welding Program

■ Procedure for handling papers on war subjects for submission in the $200,000 industrial progress award program sponsored by the James F. Lincoln Arc Welding Foundation were outlined last week by foundation officials.

The foundation suggested the following five steps:

1. Submit the proposed subject for the paper, via the local inspector of the department concerned, to the proper bureau of the Navy or Army for official approval. Address communications to the department, attention of the bureau concerned and before mailing it, have it approved by the employer if the subject involves work done by the employer. Then, hand the communication to the local inspector who will forward it to the proper authorities in Washington.

2. After the subject has been approved, proceed promptly with preparation of the paper in order that its eventual entry in the progress program will be effected.

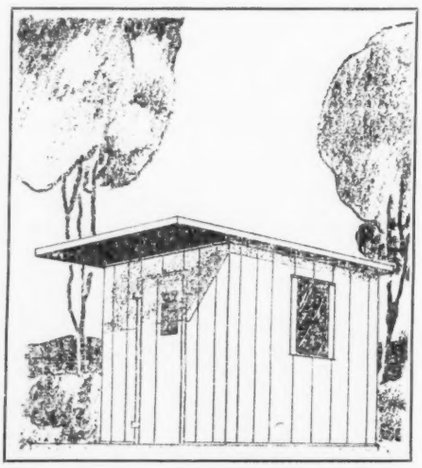
3. In writing the paper, avoid including any information which might aid the enemy.

4. Submit the paper, via the same channels as for submission of the subject to the proper department of the Navy or Army, to the attention of the bureau concerned for official approval of its contents before submitting it to the foundation.

In the letter of transmittal accompanying the submission of the paper for official departmental approval, the author should point out that the department's attention is called to the provision in the rules and conditions of the progress program that the author may withhold permission for publication of the paper and that such request does not, in any way, affect the rating of the paper for award.

5. After official approval has been given to the contents of the paper by the proper department, submit the paper in accordance with the requirements of the foundation governing papers.

Steel Sentry Shelter



■ Steel shelters for sentries patrolling Mississippi river bridges are being erected near St. Louis. Made of 20-gage galvanized sheets, the shelters can be assembled in half a day by two unskilled workers. They are designed and fabricated by American Rolling Mill Co., Middletown, O.

WPB To Force Scrapping of Derelict Autos; Requisitioning Scheduled

WASHINGTON

■ INTENSIVE program to empty the nation's auto graveyards of between four and five million old cars within six months has been launched by Lessing J. Rosenwald, chief, Bureau of Industrial Conservation.

Supervision over the collection of iron and steel scrap from graveyards has been transferred from the Iron and Steel Branch to the bureau by Donald M. Nelson, chairman, War Production Board.

Mr. Rosenwald announced a plan under which field agents of the bureau will comb the country for auto graveyards and request owners to proceed immediately to cut up cars and sell the scrap to dealers of their own choosing. A procedure has been worked out so that a requisition order can be issued within 24 hours in any cases where owners are recalcitrant. In such cases the government would take possession of the property and call for lump sum bids on all cars in the yard. A contract would then be awarded to the high bidder to cut and grade all scrap so obtained and the amount of the bid would be used by the government to establish a fair price to be paid the owner. Such a transaction would require from 30 to 90 days for completion.

In discussing the question of using government's requisitioning power, Mr. Rosenwald said that he did not contemplate the necessity of widespread use of this authority. He pointed out that prompt agreement to clean out graveyards had been obtained from three owners last week. The advantage to the graveyard operator in disposing of his cars voluntarily is great, Mr. Rosenwald stressed. Under a voluntary arrangement he is allowed a month or two to cut up his cars and dispose of the scrap at the best possible price. He may remove salable parts from the cars, and he may retain later model automobiles if they can be repaired and sold for use.

On the other hand, if requisitioning powers are used, all the cars on the lot are sold at whatever price they will bring with no provision for removal of parts.

C. B. G. Murphy will serve as chief of the new auto graveyard unit of the bureau.

It is estimated that the four and five million old cars in graveyards scattered throughout the country will yield between 3,000,000 and 3,750,000 tons of scrap.

The drive against idle scrap in auto graveyards supplements other attacks on the scrap problem already in progress under the supervision of the bureau. These include drives to salvage newly generated industrial scrap and to recover old rails, obsolete machinery, and farm and home scrap.

Allocation of iron and steel scrap will remain within the province of the Iron and Steel Branch under the supervision of Frank Vigor. L. J. Borinstein, who was consultant of the unit until Jan. 1, has consented to serve as consultant to the branch when and as needed.

OPA Photographs Show Scrap Piles Not Disturbed

Photographs proving that huge piles of iron and steel scrap have lain undisturbed in certain dealers' yards for the past three months in spite of the fact that many steel mills have been compelled to curtail operations for want of sufficient scrap supplies were released last week by OPA after being introduced in evidence before the Patman small business committee of the House.

A series of pictures taken at different times since last October in scrap dealers' yards in Brooklyn, N. Y., Elizabeth, N. J., Troy, N. Y., Fitchburg, Mass., and Portland, Me., show only one instance where piles of scrap have undergone any substantial change

Last October, at the request of the OPA, government photographers took the first pictures of the large piles of scrap. This was followed by a similar series, taken from the same positions, late in November. Recently, OPA officials testifying on the scrap situation before the Patman committee offered the pictures in evidence and the committee requested another series to reflect conditions currently.

Radio Industry To Be Converted To War Production

To free radio manufacturing facilities for a large war materials production program and to conserve critical materials, the War Production Board has ordered sharp cuts in the making of receiving sets for civilian use.

Reductions also were ordered in output of phonographs and radio phonograph combinations.

Effective immediately, Limitation Order L-44, provides for an average monthly curtailment in production during the next 90 days of more than 40 per cent below the monthly output during the nine months ended Sept. 30, 1941. Similar cuts were ordered in the number of tube sockets in the sets produced, which will result in corresponding curtailment of the number of tubes used in new sets.

The order does not affect production for certain government defense agencies, besides the Army and Navy, nor for lend-lease requirements, police departments or similar agencies of public authority in the United States, and contracts covered by a preference rating of A-1-j or higher.

In addition to freeing facilities for vital war work, the order is designed to accomplish savings during the 90-day period of an estimated 750 tons of copper, 100 tons of aluminum, 25 tons of nickel, and 3400 tons of steel.

Class A manufacturers, those who sold more than $1,000,000 worth of radio sets and phonographs for civilian requirements during the first nine months of 1941, were ordered to reduce output by 45 per cent. Class B firms, whose sales were under $1,000,000, must curtail production by 35 per cent.

The radio manufacturing industry, has been asked to undertake a $2,000,000,000 military production program.

Class A companies already have received or soon will be awarded big war orders, and swift conversion of their plants to 100 per cent military activity may be expected. Until a larger number of the small (Class B) firms receive more Army and Navy orders, the lighter curtailment ordered in their production will provide them with sufficient civilian operations to keep their skilled labor force intact.

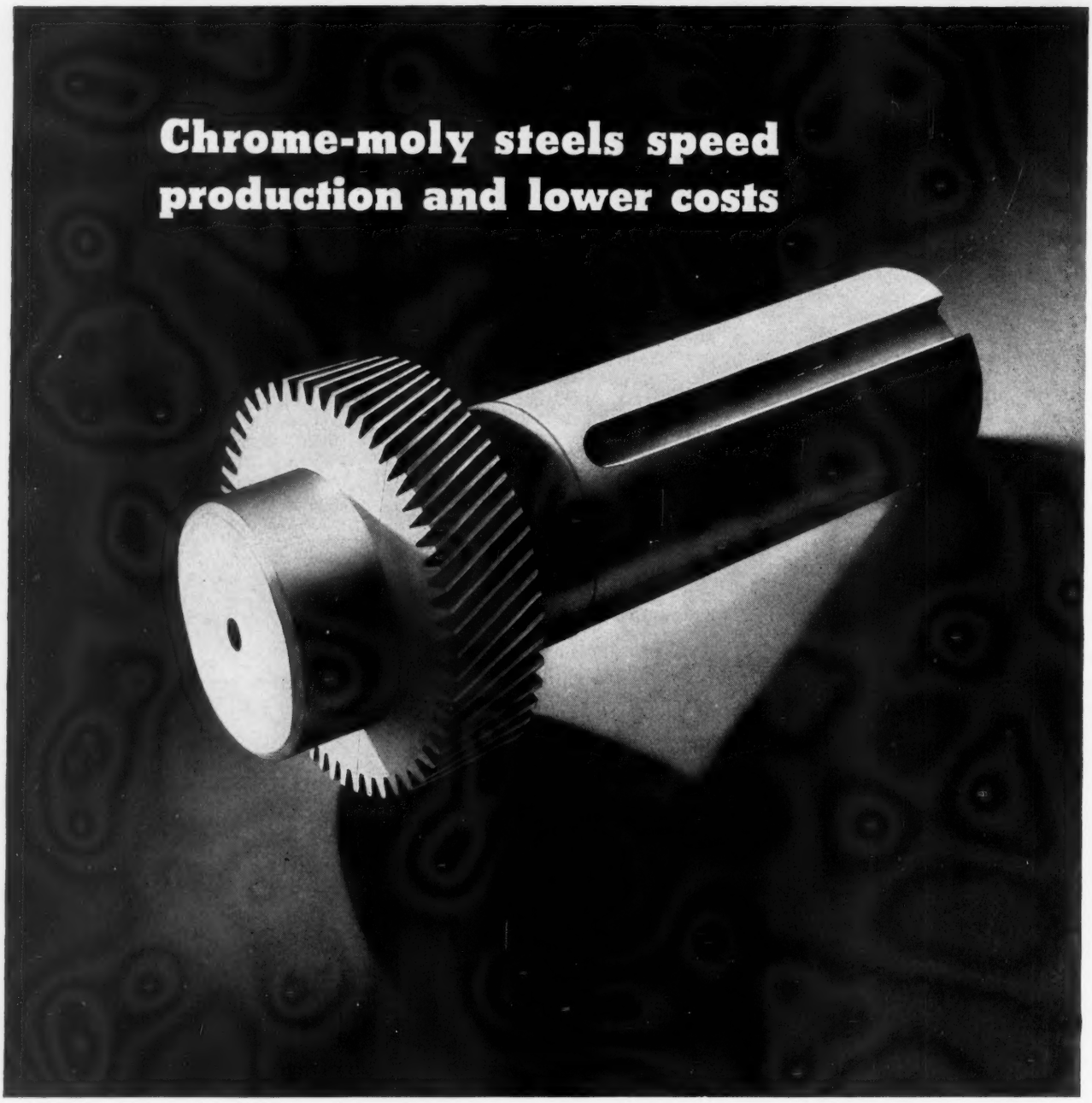
Priority Assistance Not To Be Extended for Air Raid Shelters

Priority assistance will not be granted for the construction of air raid shelters in the United States, J. S. Knowlson, director, Division of Industry Operations, said following a conference between officials of WPB and the Office of Civilian Defense.

Decision was reached following a careful analysis of the materials which would be required for shelters and the quantities of such materials available by representatives of OCD and the industry branches of WPB.

Benefitting from British experience and the skill of American engineers, OCD has developed a design for a reinforced concrete protective shelter to hold 24 persons which uses a minimum of metal. Even this shelter, however, would require about 4750 pounds of steel for reinforcement and for a steel door. The amount of steel necessary to build enough of these shelters to protect citizens inhabiting all the coastal areas of the United States would run into fabulous amounts.

Chrome-moly steels speed production and lower costs



A manufacturer of speed reduction gear pinions is taking advantage of two of the outstanding advantages of Chromium-Molybdenum (4140) steel — uniform hardening in heavy section, and excellent machinability at intermediate hardnesses.

Pinion and shaft are machined integral from a 4140 round oil quenched and tempered to about 150,000 p.s.i. tensile and 300 B.H.N.

Uniformity in hardness of the heat treated bar assures adequate strength in the shaft even though its diameter is only about half that of the pinion. This integral construction eliminates an assembly operation and makes for better performance.

Send for our free technical book, "Molybdenum in Steel". It contains helpful data on Molybdenum steels that may be of assistance in your own problems.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE — BRIQUETTED OR CANNED • FERROMOLYBDENUM • CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue • New York City

MOLY

Mirrors of *MOTORDOM*

Drums beat as industry's war council moves into action. Parts manufacturers and tool and die shops join in crusade. First job to correlate overall needs for tooling and equipment with available machines. Manufacturers urged to apply ingenuity to simplification of war equipment . . . May have to go to the front for service data . . . O.K. tripling of parts output for six months

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ REPRESENTATIVES of what used to be the automobile and auto parts industries, 1200 strong, gathered in the auditorium of the Masonic Temple here about a week ago for what in many respects was a historical session. It marked the first occasion when car builders, tool and die shop operators, and a majority of the parts manufacturers ever sat down together to draw up the broad outlines of a common cause and to pledge their efforts to a common end. It also marked the first full meeting of the auto industry's council for war production, and there was the suggestion at least that direction of the industry's war program has been transferred from Washington to Detroit, where it belongs.

On the stage sat the war council, flanked by Army and Navy representatives. In the audience sat key executives of an industry spread over 30 states and 130 cities which in 1941 did an estimated business of $1,800,000,000 and employed 250,000.

The meeting was divided roughly into two sections, the first presenting the "pep talks" by leaders of the industry, the second outlining the general mechanics whereby the war council hopes to spread the technical knowledge and make accessible its tools and plants without delay.

Ernest C. Kanzler, chief of the automotive branch of the WPB and now located in Detroit, acknowledged that the actual physical job of putting the various resources of the industry to war work must be done by the industry itself, but added that government has the ultimate responsibility for the overall planning for the best use of the nation's resources.

Mr. Kanzler, who came up through the ranks in the financial side of the motor industry, is obviously no "crackdown" specialist and has the backing of the entire motor industry in his new job. Statements coming out of Washington to the effect that "if Ford has tools which can be more effectively used by General Motors, Mr. Kanzler can order those tools transferred" may serve as a dramatic interpretation of his authority, but by no stretch of the imagination will it work out this way in practice.

In the first place, detailed surveys of the equipment and tools needed must be stacked up against the equipment and tools available. These are now in process and orderly negotiations between industry groups will obviate the need for any WPB "manifestos". Co-operation and teamwork, it is felt, will accomplish ten times the results of executive orders.

The war council meeting reminded one of a typical football rally on the eve of the big game of the year at any of a hundred universities throughout the country. There in the audience sat the student body, listening attentively to every word and ready with the applause for every strong plea from the stage. There, up on the stage, was the college dean, the president, the football coach, the quarterback and a few all-American halfbacks, each contributing a few words of inspiration, beseeching the audience for that "do or die" spirit on the 'morrow when the big game started.

Down in front sat a score of news men and photographers, most of them scratching their heads trying to figure out what was being accomplished by this epochal meeting.

Hope To Avoid Commuting Trips to Washington

It is just possible that so much was being accomplished its importance sailed right over the heads of the press. When E. A. Clark, of Budd Wheel Co., told of the typical business man's visits to Washington in search of war contracts, featured by wanderings from one office with 16 stenographers and one lieutenant into another office with 16 lieutenants and one stenographer, and still coming home empty-handed, he was not just trying to be funny. If the automotive war council can end the necessity of commuting between industries of the Middle West and Washington in a futile search for war contracts then it has made a major contribution, both to these industries and to the war effort as a whole.

There was wholehearted agreement with the statement of K. T. Keller, president of Chrysler, who said we have been spending too much time on "black print" and not enough on "blueprint," the kind of thing the production man understands. He admitted the blueprints have been coming pretty fast since the first of the year, however.

Mr. Keller urged parts manufacturers to put forth intensive effort to understand the function of the new pieces or parts they are making, to the end that the ingenuity of industry can be utilized to simplify and speed up the production of war equipment. In a sense, the automotive industry has been eminently successful because of this ingenuity of its engineers and its suppliers' engineers, talent which must now be switched to the field of armament.

Engineer Gives Blueprint For Victory Effort

O. E. Hunt, vice president of General Motors, delivered the principal address of the session, a talk over which he spent considerable time. He said he was not expecting to make any more speeches for a long time, so he wanted to say everything he had on his mind and then go back to work.

Likening the war program to a

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new model in the motor industry, Mr. Hunt observed that while the overall technique remains the same, new detailed procedures must be worked out from the ground up because of vast differences between war products and peacetime equipment. He pointed out that "this highly involved technique of change, this preparation to make something different, this *know how*, this knowledge born of intensive experience extending over a third of a century, is the one big thing that the automobile industry has offered the country, which no other industry can offer in the same degree."

He cited as the essence of successful mechanized war the *maximum quantity* of weapons of *maximum quality* produced by methods which led themselves to *maximum progress* in military effectiveness, all tuned to a *minimum time* requirement. That's the job—in a nutshell.

On the matter of new developments of a patentable nature, either in products or processing, Mr. Hunt favors the disclosure of such improvements to others producing similar material. "We should grant for military use and without remuneration the right to manufacture under our patents for the duration of the war and, let's say, for six months thereafter, in return for like rights flowing from them to us. We are no longer in competition," he concluded.

Inasmuch as every good engineer looks on the subject of service as his "right bower," Mr. Hunt brought up the matter of following through on war equipment in action to determine its shortcomings or service requirements. He said: "Since the field of battle is the only adequate proving ground, some of us must actually go to the front and stay on the front so as to report the engineering facts on any weaknesses that may develop, to the end that they may be more quickly corrected in production."

Incidentally, such a procedure is being followed to a certain extent in connection with GM's Allison engine production.

The auto industry can boast of few better public speakers than Paul G. Hoffman, president of Studebaker who also appeared on the war council program, strongly endorsing the merits of free enterprise. He said: "I believe with all my heart and soul that free management and free labor, each doing its part of the job, but co-operating with each other and the government, can outproduce any economy in which labor is enslaved and management shackled."

Bringing Machines to the Work and Vice Versa

Mechanics of the war council's first steps are divided into four sections. First is a "tooling information service" to be operated by the Automotive Tool and Die Manufacturers Association. This effort will list both equipment and tool-hours available in every tool shop in the industry, both independent and captive, providing data which will be correlated with a survey of the needs for tooling service. No actual placing of work will be involved, all negotiations being left to the parties concerned.

Second is a "machine tool and equipment service" which will report location and type of all machines and equipment not active on war production. Forms for such listings already have been sent to 1500 companies and returns are now being received. It is estimated that of the 350,000 pieces of equipment in the industry, about 150,000 will be reported by the service. The unfortunate part is that the idle equipment likely will be of the same general class throughout the industry—stamping presses, for example—and there may be little utility in such listed equipment.

Third is a "contract information service" which will prepare "shopping lists" (first is already issued) showing general character of work for which sources are sought by companies in the industry preparing to subcontract, as well as complementing reports listing companies seeking subcontracting opportunities. This service will be linked closely with the contract distribution service of the WPB in Detroit.

Fourth is the organization of product subdivisions of the council in which members of the industry engaged in similar work can pool their information on methods of production. Heads of these divisions are as follows: Airplane engines—N. Dreystadt of Cadillac; airframes—C. E. Bleicher of De Soto; ammunition—E. A. Clark of Budd Wheel; artillery—R. G. Waldron of Hudson; small arms—W. C. Williams of General Motors; marine equipment—G. T. Christopher of Packard; military vehicles and parts—I. B. Babcock of Yellow Truck; propellers and equipment—D. O. Thomas of Bendix Aviation, and tanks—E. J. Hunt of Chrysler.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
Sept.	192,679	284,583	248,751
Oct.	324,689	514,374	401,360
Nov.	368,541	510,973	373,892
11 mos.	3,219,748	4,188,808	4,806,443
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Wards Reports

Week ended:	1942	1941†
Jan. 3	18,530	76,690
Jan. 10	58,990	115,935
Jan. 17	75,025	124,025
Jan. 24	79,930	121,948
Jan. 31	73,305	124,400

†Comparable week.

Analysis of War Production

Amplifying statements that General Motors was looking to undertake about 10 per cent of the country's war production, officials have said that on the basis of present contracts (Jan. 22) the corporation is building or preparing to build about 33 per cent of all machine guns, 50 per cent of the army trucks, 50 per cent of the navy diesel engines; 40 per cent of the aviation engines, 25 per cent of the tanks, and substantial quantities of airplanes, antiaircraft guns and smaller material.

Divergent Views on Parts

Manufacture of replacement parts for passenger cars and light trucks during the period from Jan. 1 to June 30 has been limited to 150 per cent of the total produced in the calendar year of 1941. This in effect permits a tripling of parts production from last year's level, the hope being that a two-year stock of parts can be built up in this six-month period.

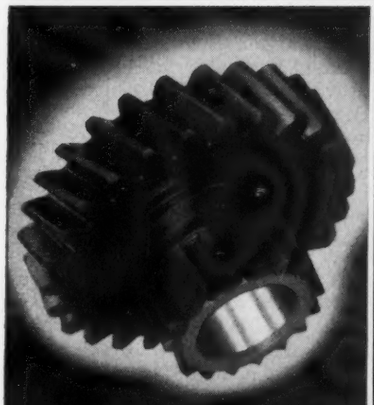
However, there is considerable confusion apparent over the parts order. As far as the motor companies themselves are concerned, they are taking the matter in stride and expect no interference with war work. Shipments of service parts by motor companies last year amounted to only 10 per cent of the dollar volume of passenger car shipments. However, there are many parts companies whose entire livelihood depends on the replacement parts business, and they are disturbed over the plan to concentrate two years of production into six months, particularly when the producer can get only A-10 priority on materials. The motor companies have the further advantage of being able to keep 15-20 per cent of their normal employment busy on parts production for six months, thereby providing work for men who otherwise might have to be laid off during the tooling period on war work.

WPB has authorized a 34 per cent increase in production of medium and heavy trucks during March over the same month last year. Quota amounts to 54,710 units, and A-3 preference rating applies on material.

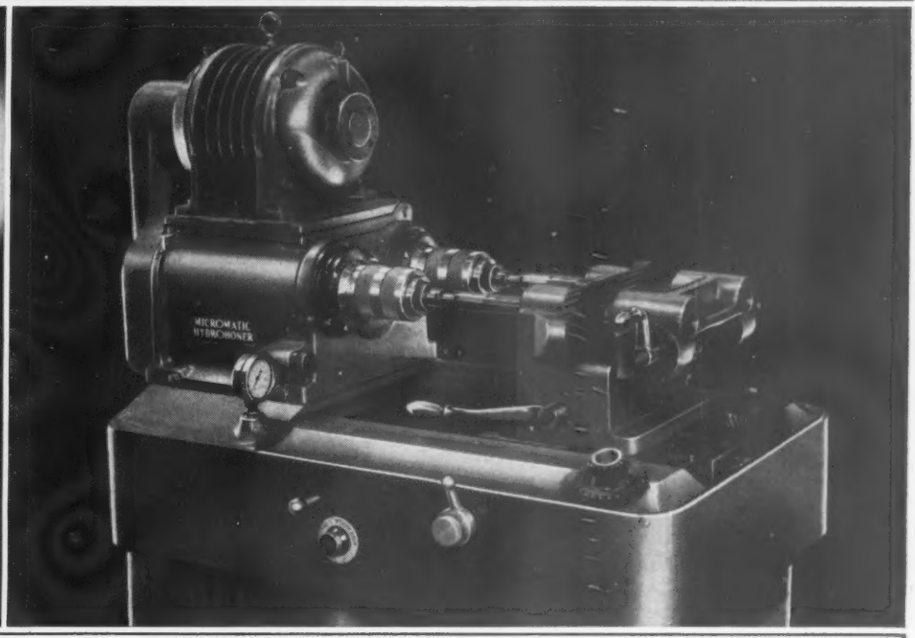
MICROMATIC HYDROHONER
with
AUTOMATIC MICROSIZE

Generates

Uniform Size within .0002″ to .0005″
Bore Accuracy within .0001″ to .0002″
Removes Sufficient Stock for Above Results

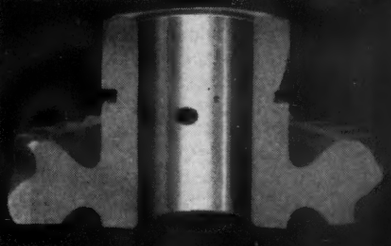


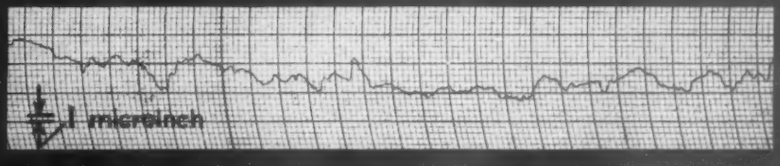
Automatic
Second Speed
Gear



In forged steel second speed gear bores 1.062″ I.D. x 1.886″ long, and Rockwell C 49-54 hardness; total error up to .001″ is corrected by removing .001″ to .0015″ stock following grinding, generating uniform size within .0005″, geometric accuracy within .0001″ to .0002″ and surface smoothness accuracy within 1.8 to 2.5 microinches root-mean-square—all at the rate of 240 bores per hour on this two spindle machine.

Generates any desired type and degree of surface smoothness

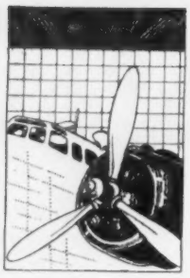




Circumferential (root-mean-square)—1.8 to 2.5 millionths of an inch

MICROMATIC HONE CORPORATION
1345 E. Milwaukee Ave. **Detroit, Michigan**

WING TIPS



Power conveyor systems forecast future trends in mass production of fighting planes. Special installations designed to move subassemblies and parts through plants, relieving load on trucking . . . Autobody plants complete half-million man-hours of die, jig and fixture work for bomber parts production . . . Small engine features multipiece crankshaft . . . Republic Steel chairman fitting pieces together in huge airplane-engine-propeller-parts industry

■ REDUCED to its simplest terms, mass production has been defined by engineers as a means of insuring that the right amount of the right kind of parts and subassemblies arrives at the right place at the right time for final assembly. Large airplane plants, moving as fast as they know how into a mass production technique with which they never have been familiar, are learning the essentials and logically are finding that one of the keys to this type of production is the application of power conveyor systems of all types.

Airplane subassemblies naturally call for some different types of conveyor systems, compared with those perfected for, say, the automobile industry, but basically the principles involved are the same. One of the most recent conveyor innovations is the "vertical assembly line" at Douglas Aircraft Co.'s El Segundo plant in California where nose sections for attack bombers are being assembled.

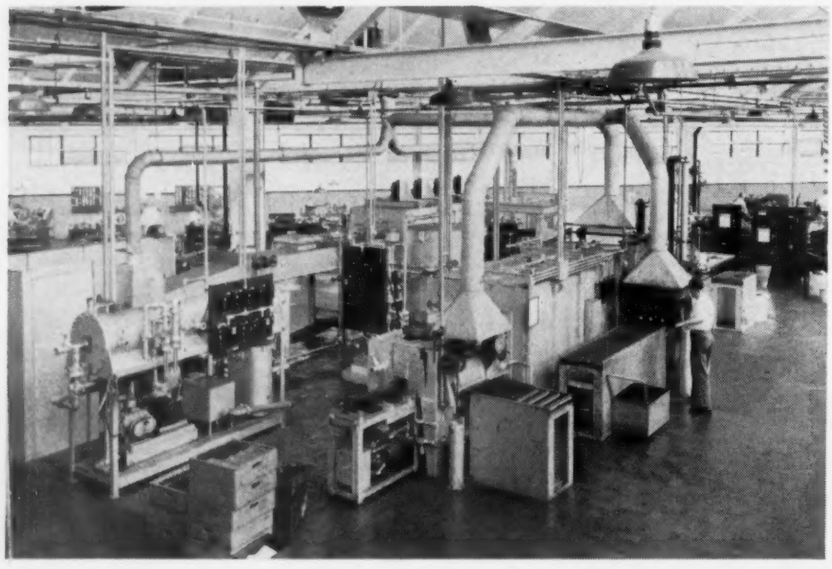
These nose units, weighing 300 pounds each, represent nearly every type of fabrication and assembly contained in a completed airplane, having frame structure, armament, instruments, glass, plumbing, electrical equipment, hydraulic installations and seats. To facilitate their assembly through various stages, it was found advisable for the sections to move down the line in a position comparable to that which they assume in the airplane itself. Hence the vertical assembly line, which has the general characteristics of the horizontal track but at the same time is accessible from all sides, as well as top and bottom.

As described in a recent issue of *Douglas Airview*, the line comprises a series of H-beams set in concrete foundations in the floor of the plant, to which are attached the longitudinal rails. Heavy reinforced face plates are mounted on these rails by means of flanged rollers which permit easy movement down the line. The plates are tied to each other by means of a 6-foot tie bar and the entire line moves in unison. The nose sections, of course, are mounted on the face plates and travel down both sides of the assembly line.

An ingenious turntable device at the end of the line transfers the work from one side to the other without requiring removal from the carrying plate. As the nose nears the last station of the line, it is removed from the traveling face plate and attached to a hinged face plate equipped with counterbalances which swings the part to an upright position for necessary trimming and routing operations. It is then removed and placed in a saddle for painting and camouflage prior to shipment to the Long Beach, Calif., assembly plant.

Four advantages are claimed for this novel system: (1) The unit remains in a position which it normally assumes in the airplane; (2) the fixture upon which the assembly is built is completely unobstructed by rails, tracks and the like, and is accessible from all sides except the rear; (3) parts are at a convenient height from the floor for access by a man of average height; and (4)

Hardening Aircraft Parts at Bendix Plant



■ **Section of the clean, well lighted and well ventilated heat treating department in Eclipse Aviation Division of the Bendix Aviation Corp., Bendix, N. J., showing in foreground a Westinghouse bright hardening furnace which has capacity for 500 pounds of small steel parts an hour. It is an 80-kilowatt electric pusher furnace using cracked city gas atmosphere (generator at left). Parts are set in trays which are placed in furnace from side door. Hydraulic ram pushes parts through chamber and at the end of the furnace a plunger pushes trays on elevator for quenching cycle, from which they are removed by operator, as shown. Hardened parts then are loaded on belt conveyor of 55-kilowatt draw furnace (left rear) with nonscaling gas atmosphere**

Could you spread your Stainless *Thinner?*

If you manufacture a stainless product which requires the alloy characteristics on only one surface, then single-armor Pluramelt is a material you ought to investigate.

If corrosion has to be resisted on both surfaces, there's double-armor Pluramelt. In either case, large amounts of vitally needed alloys would be conserved for other essential purposes. These two types of Pluramelt use only 20% and 40%, respectively, of the chromium and nickel required for solid stainless steel of the same cross-section.

You benefit in other ways, too. Pluramelt involves favorable first cost, and marked ease of fabrication. It can be produced with almost any grade of stainless on one or both sides of a mild or low-alloy steel base—*and it can't come apart*—a fact we can amply prove to you by laboratory test and field service records.

Let us tell you more about this exclusive material, as it may apply to your products. Just mail the coupon below.

PLURAMELT — STRONGER AGAINST CORROSION HEAT WEAR

ALLEGHENY LUDLUM
STEEL CORPORATION PITTSBURGH, PA.
Branch Offices in AL *Principal Cities*
STOCKS OF STAINLESS CARRIED BY ALL RYERSON WAREHOUSES

Allegheny Ludlum Steel Corporation S-210
Oliver Building, Pittsburgh, Penna.
I'm interested in Pluramelt—send me data.
NAME _____
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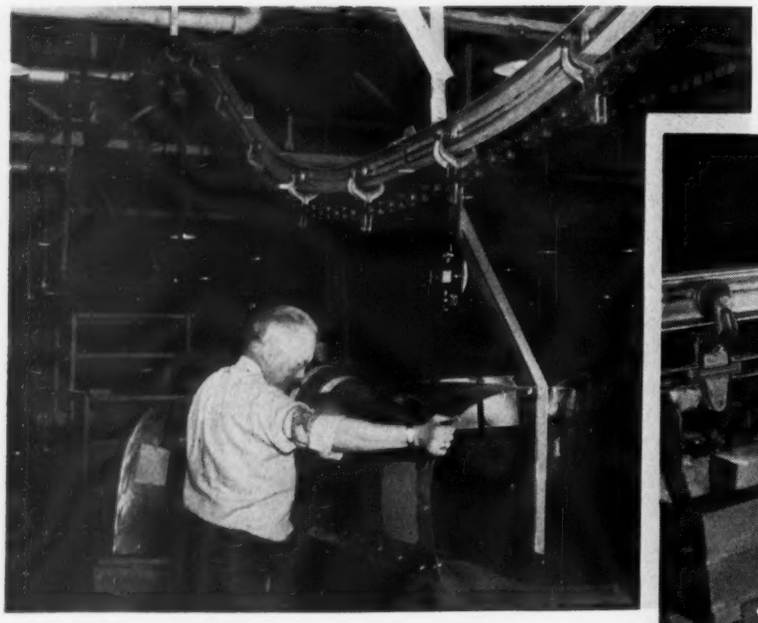
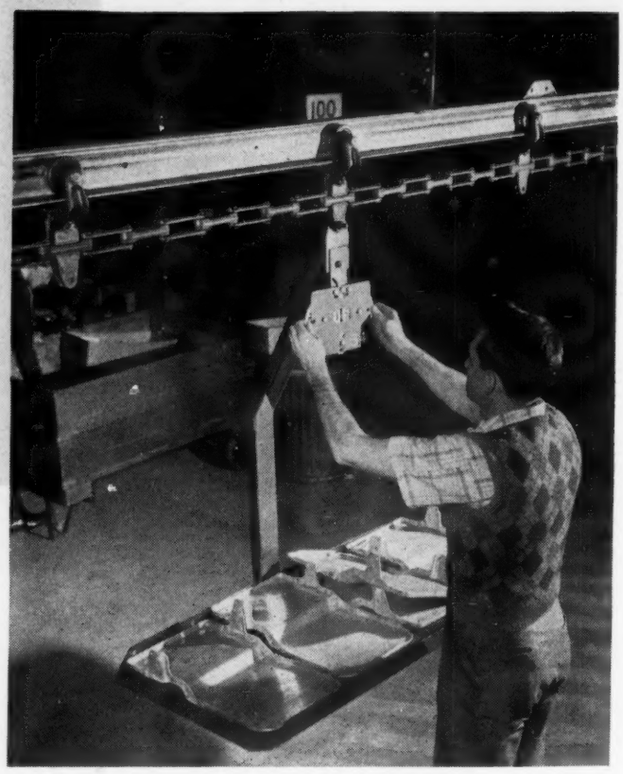




■ Operator loads fuselage panel on carrier at one of the 22 station "drops" in the new mile-long parts conveyor at the Bell Aircraft plant in Buffalo. Right: Indicator panel on each of the 170 carriers shows carrier number, and can be set for numbered unloading station. Normal chain speed is 30 feet a minute

the fixtures have sufficient clearance from the floor to avoid obstruction by benches, ladders and other equipment, thereby minimizing the possibility of damage to the work.

A further innovation is the fact that the use of elaborate jigs and fixtures on the production line itself is eliminated. All subassembly work is done immediately adjacent to the line and the large sub-units are built up in stationary tooling before reaching the line. All holes are coordinated and drilled to full size, thus reducing drilling on assembly to a minimum.

Major subassembly units are held in place on the line by means of a simple tubular support mounted from the face plate to an attaching point well forward in the nose section. By this simple jig the entire structure is held rigid, torsionally and otherwise, while initial riveting operations are carried out.

Engineers see in this novel assembly system the pattern of future high-speed assembly.

Mile-Long System Features Traffic-Control Plan

Another unusual conveyor system is that placed in operation by Bell Aircraft Corp., to speed delivery of Airacobra parts from one section of its Buffalo plant to another. It is an overhead chain conveyor 4620 feet in length serving 22 stations in the plant, the chain moving at a normal speed of 30 feet a minute.

Moving portion of the conveyor weighs 45,000 pounds and mounts 170 carriers, each with a capacity of 100 pounds of parts. The carriers are horizontal trays supported by channel arms, but the system is now being extended to accommodate 170 hooks for the additional handling on slings of parts too large for the trays, as well as 60 heavy wire baskets for movement of small parts. When the improvements have been made, the conveyor will be able to carry the largest single part used in the P-39 pursuit ship.

The conveyor chain is supported by 1700 trolleys, and despite the fact that a total of 31 tons of weight is in motion when the conveyor is fully loaded, ample power is provided by a 5-horsepower motor through V-belt drive. There are 29 turns in the track system, and 36 pairs of inclined guards.

An interesting method of traffic control has been worked out for the system. Each carrier has a small indicator panel mounted on the trolley and this can be set for the number of the destination station. Special telephones have been installed at each station, with individual code numbers. When a tray is loaded, the indicator is set and the "consignee" advised by telephone. Each of the 23 stations keeps its own complete daily traffic records, including part numbers, number of pieces, dispensing and receiving station numbers and serial numbers of carriers. Estimates indicate that in 24 hours over 500,000 individual parts and pieces are moved in 20 miles of continuous traffic.

As a safety control, eight emergency switches have been located at strategic points. If the conveyor has forced a stop, a full explanation is made on an accident report form by the station operator nearest the stoppage. These reports are checked carefully and defects remedied to insure uninterrupted flow of material.

At one point, the conveyor moves through a fire door in the plant. Here, a system of interlocking photoelectric cells guards against the conveyor blocking the door, or the door doing damage to the conveyor. Entering and leaving the drop hammer department, the conveyor travels through a sound-absorbing tunnel, so that the noise of the hammers will not disturb the electrical instrument assembly department located nearby.

Body Plants Take Airplane Work in Stride

Eight Fisher Body plants in Detroit and one each in Flint, Mich., and Grand Rapids, Mich., have just about completed 500,000 man-hours

of preparatory work in connection with furnishing jigs, fixtures, dies and templates for production of B-25-D Mitchell bomber sections (North American bomber recently rechristened to honor the memory of the late Gen. Billy Mitchell). These parts will be shipped to the Fisher division at Memphis for subassembly and thence to the North American plant at Kansas City, Kans., for final assembly.

On a man-hour basis, and excluding motors and instruments, Fisher Body will do 55 per cent of the work on these medium bombers. Preparatory work involves production of some 725 jigs and fixtures, 5000 dies for panel stampings, as well as templates and related items. Some parts, such as air, heating and ventilating ducts, bomb racks, floor assemblies, fuel tanks and exhaust collectors, will be produced in Detroit plants and shipped direct to Kansas City, bypassing the Memphis plant.

Builds Horizontal Engine

Described at a recent S.A.E. meeting in Los Angeles, a new type of airplane engine conceived by William B. Stout has intrigued engineers. One feature of the engine is a multipiece crankshaft, with pins and arms bolted together, and concentric semicircular serrations on mating surfaces to provide tight joints. Use of the built-up shaft permits one-piece connecting rods, standard types of roller bearings, one-piece crankcase, better alignment, lower cost and a stronger construction, according to Mr. Stout, who is engaged now in building a 4-cylinder 100-horsepower version of this horizontal-opposed type engine.

Stout Skycraft Corp. also is busy on preliminary work prior to undertaking manufacture of the small pusher-type plane of stainless steel construction which was announced some time ago. Originally conceived as a popular and safe type of private airplane, the project has now been redirected to Army needs, so the possibility of any private usage is remote.

Engineer Accorded Honor

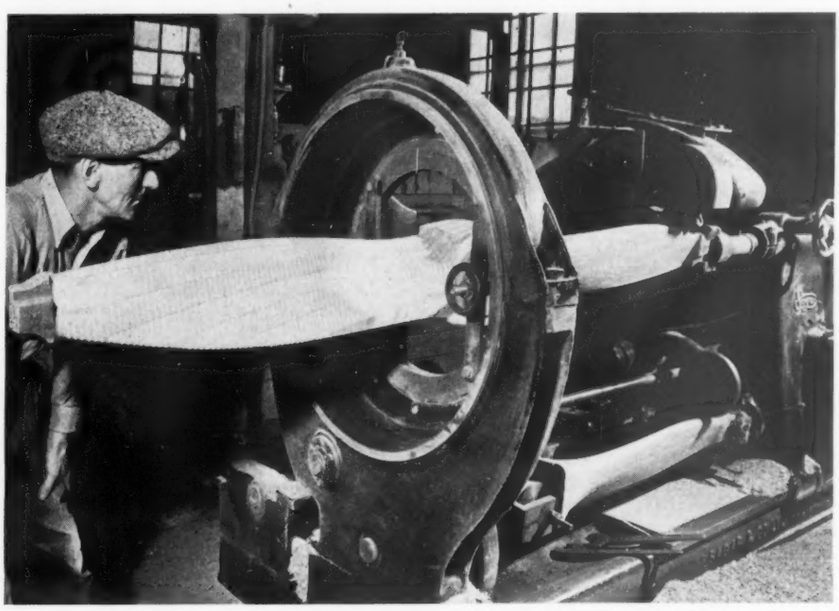
H. L. Hibbard, vice president and chief engineer of Lockheed, has been elected president of the Institute of the Aeronautical Sciences, succeeding Frank W. Caldwell, director of research for United Aircraft. Mr. Hibbard helped in pioneering the development of the twin tail featured on present Lockheed ships, and the single-spar all-metal airplane wing. His designs have used increasingly heavy wing loadings and include an experimental tail-first or canard type of airplane.

Steel-Aircraft Organization

Culmination of the deal under terms of which Vultee Aircraft purchased 34 per cent of the common stock of Consolidated Aircraft has laid the ground work for one of the largest steel-aircraft organizations in the world. T. M. Girdler, chairman of Republic Steel, now is chairman of both Consolidated and Vultee. Harry Woodhead, formerly chairman of Vultee and for many years with Republic Steel, now is president of Consolidated and executive vice president of Vultee, while Richard W. Millar, the banker whom Girdler is supposed to have selected years ago to "make something" out of Vultee, retains his post as president of Vultee and becomes executive vice president of Consolidated.

Consolidated Aircraft is perhaps three times the size of Vultee, if not more, and the absorption of the former into the latter had its surprising aspects. Also in the Vultee-Consolidated corporate picture are the Stinson divisions at Wayne, Mich., and Nashville, Tenn.; the Lycoming Manufacturing division in Williamsport, Pa.; Republic Aircraft Products in Detroit, and the new American Propeller division in Toledo, O. Add to these the close tie-up now existing between Consolidated and the Ford operations relating to bomber construction, as well as Mr. Girdler's retention of control in Republic Steel, and you have the outlines of one of the largest industrial groups the country has ever known.

Profiling Lathe Speeds Propeller Output



■ **Only 30 minutes are required to turn out a propeller for a Canadian training plane on this profiling lathe. Formerly the job required six hours by a skilled laborer. The scene is a Winnipeg, Man., factory. NEA photo, passed by Canadian censor**

Expect Approval of Loan For Texas Steel Plant

DALLAS, TEX.

■ Final approval of a loan of $10,000,000 for the construction of the first unit of the proposed iron and steel plant to be located here, by the Southwestern Iron & Steel Co. is expected soon by the Reconstruction Finance Corp. through Defense Plants Corp., according to information received by John W. Carpenter, Dallas, chairman of the committee of citizens promoting the project. Mr. Carpenter, who is also president of the Texas Power & Light Co., has received assurances from Washington that the loan will be made.

"The federal loan for the plant eventually will amount to nearer $30,000,000 than $10,000,000," he stated. "The furnace would tap the 200,000,000 tons of iron ore in 20 Texas counties. It would literally be nested on top a 100,000,000-ton deposit of iron ore in the eastern edge of the state.

"At Daingerfield, our longest haul after several years of mining operations, will be six miles.

"The furnace will employ coke and limestone in an old, tried method of smelting rather than experimenting with natural gas fuel. It will be managed by 20 business men from the East Texas area."

Mr. Carpenter said construction on the plant would start within a few weeks.

Production of Finished Steel Up 34.5% in 1941

■ Steel produced for sale in 1941 totaled 65,361,688 net tons, an increase of 16,776,828 tons, or 34.5 per cent, over 48,584,860 tons in 1940, according to the American Iron and Steel Institute. Figures are based on reports from 196 companies, representing 98 per cent of total output of finished rolled products in 1940.

Practically every product participated in the increase and the percentage of mill capacity operated was high. Plates averaged 106.6 per cent of capacity for the year, with output of 6,027,001 tons, against 4,194,932 tons in 1940. Sheet production totaled 12,855,283 tons, at 96.3 per cent of capacity; bars 11,775,168 tons, 88.2 per cent; tin plate, 3,565,885 tons with production of hot-rolled tin plate at 74.2 per cent of capacity and cold-reduced at 87 per cent.

Material shipped to other members of the industry for further conversion in 1941 amounted to 4,418,709 tons, compared with 2,618,889 tons in 1940.

December production totaled 5,527,210 tons, 276,244 tons, 5.27 per cent above 5,250 966 tons made in November. The December output was 617,762 tons, 12.6 per cent, greater than 4,909,448 tons made in December, 1940.

In December plate production of 635,812 tons was at 132.6 per cent of rated capacity. Steel piling output of 43,615 tons was at 121.9 per cent. Bars, totaled 1,025,601 tons, equivalent to 90.6 per cent of capacity. Hot-rolled tin plate production was 46,060 tons and cold-reduced 320,706 tons, 105.4 and 103.4 per cent of capacity, respectively. Sheets totaled 905,980 tons, 80.1 per cent of capacity.

In accordance with government policy export figures have been deleted. Record of exports for November and prior months appeared in STEEL, Dec. 29, page 24.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

December - 1941 (PERIOD)

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export *	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export *	Year to Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS	Ingots, blooms, billets, slabs, sheet bars, etc.	42	1	xxxxxxx	611,921	xxx		173,635	6,925,892	xxx		2,078,405
	Heavy structural shapes	9	2	5,248,400	368,773	82.9		xxxxxxx	4,586,652	87.4		xxxxxxx
	Steel piling	4	3	422,000	43,615	121.9		xxxxxxx	365,999	86.7		xxxxxxx
	Plates—Sheared and Universal	20	4	5,654,360	635,812	132.6		7,031	6,027,001	106.6		40,466
	Skelp	8	5	xxxxxxx	72,702	xxx		46,008	994,989	xxx		546,026
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	131,263	42.9		xxxxxxx	1,708,464	47.3		xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	10,329	40.2		xxxxxxx	165,572	54.7		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	2,214	25.6		xxxxxxx	28,730	28.2		xxxxxxx
	Splice bar and tie plates	15	9	1,312,200	44,832	40.3		xxxxxxx	675,735	51.5		xxxxxxx
	Bars—Merchant	44	10	xxxxxxx	557,446	xxx		67,700	6,425,670	xxx		752,174
	Concrete reinforcing—New billet	20	11	xxxxxxx	149,011	xxx		xxxxxxx	1,639,256	xxx		xxxxxxx
	Rerolling	20	12	xxxxxxx	18,389	xxx		xxxxxxx	253,095	xxx		xxxxxxx
	Cold finished—Carbon	25	13	xxxxxxx	105,224	xxx		xxxxxxx	1,243,962	xxx		xxxxxxx
	Alloy—Hot rolled	19	14	xxxxxxx	168,273	xxx		32,517	1,903,758	xxx		283,079
	Cold finished	19	15	xxxxxxx	19,916	xxx		xxxxxxx	198,201	xxx		xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	7,342	xxx		xxxxxxx	111,226	xxx		xxxxxxx
	TOTAL BARS	68	17	13,354,925	1,025,601	90.6		100,217	11,775,168	88.2		1,035,253
	Tool steel bars (rolled and forged)	17	18	187,550	14,926	93.9		xxxxxxx	153,953	82.1		xxxxxxx
	Pipe and tube—B. W.	16	19	2,242,040	156,023	82.1		xxxxxxx	1,768,253	78.9		xxxxxxx
	L. W.	8	20	895,260	38,747	51.1		xxxxxxx	485,270	54.2		xxxxxxx
	Electric weld	7	21	1,071,020	57,247	63.1		xxxxxxx	726,507	67.8		xxxxxxx
	Seamless	15	22	2,997,160	186,880	73.6		xxxxxxx	2,183,348	72.8		xxxxxxx
	Conduit	8	23	174,140	13,486	91.4		xxxxxxx	161,328	92.6		xxxxxxx
	Mechanical Tubing	10	24	399,000	31,454	93.0		xxxxxxx	350,172	87.8		xxxxxxx
	Wire rods	22	25	xxxxxxx	118,463	xxx		18,464	1,495,945	xxx		248,316
	Wire—Drawn	41	26	2,293,490	190,354	97.9		2,440	2,307,623	100.6		23,112
	Nails and staples	18	27	1,153,930	57,647	58.9		xxxxxxx	782,234	67.8		xxxxxxx
	Barbed and twisted	16	28	474,210	24,383	60.7		xxxxxxx	279,780	59.0		xxxxxxx
	Woven wire fence	16	29	777,785	19,350	29.3		xxxxxxx	296,506	38.1		xxxxxxx
	Bale ties	11	30	110,970	5,468	58.1		xxxxxxx	81,554	73.5		xxxxxxx
	All other wire products	8	31	62,380	3,679	69.6		xxxxxxx	39,118	62.7		xxxxxxx
	Fence posts	13	32	122,165	4,581	44.2		xxxxxxx	67,553	55.3		xxxxxxx
	Black plate	11	33	340,030	58,152	201.7		78	474,433	139.5		175
	Tin plate—Hot rolled	7	34	515,620	46,060	105.4		xxxxxxx	382,834	74.2		xxxxxxx
	Cold reduced	11	35	3,658,540	320,706	103.4		xxxxxxx	3,183,051	87.0		xxxxxxx
	Sheets—Hot rolled	29	36	xxxxxxx	551,121	xxx		16,579	7,466,687	xxx		201,744
	Galvanized	16	37	xxxxxxx	100,532	xxx		xxxxxxx	1,621,635	xxx		xxxxxxx
	Cold rolled	18	38	xxxxxxx	201,711	xxx		xxxxxxx	3,024,960	xxx		xxxxxxx
	All other	13	39	xxxxxxx	52,616	xxx		xxxxxxx	742,001	xxx		xxxxxxx
	TOTAL SHEETS	31	40	13,347,160	905,980	80.1		16,579	12,855,283	96.3		201,744
	Strip—Hot rolled	25	41	3,291,430	152,963	54.8		18,362	2,013,436	61.2		245,212
	Cold rolled	40	42	1,553,110	105,719	80.3		xxxxxxx	1,322,066	85.1		xxxxxxx
	Wheels (car, rolled steel)	5	43	422,320	29,602	71.4		xxxxxxx	268,165	63.4		xxxxxxx
	Axles	7	44	453,470	20,371	53.0		xxxxxxx	201,553	44.4		xxxxxxx
	Track spikes	11	45	325,770	14,221	51.5		xxxxxxx	171,113	52.5		xxxxxxx
	All other	8	46	78,600	7,686	115.4		xxxxxxx	56,408	71.8		xxxxxxx
	TOTAL STEEL PRODUCTS	171	47	xxxxxxx	5,527,210	xxx		382,814	65,361,688	xxx		4,418,709
	Pig iron, ferro manganese and spiegel	31	48	xxxxxxx	754,211	xxx		303,870	8,190,933	xxx		2,846,174
	Ingot moulds	5	49	xxxxxxx	77,456	xxx		xxxxxxx	821,230	xxx		xxxxxxx
IRON PRODUCTS	Bars	13	50	175,915	10,221	68.5		675	102,924	58.5		6,008
	Pipe and tubes	3	51	109,300	6,969	75.2		xxxxxxx	71,152	65.1		xxxxxxx
	All other	2	52	71,000	2,286	38.0		-	22,993	32.4		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	15	53	291,715	19,476	78.8		675	197,069	67.6		6,008

* In accordance with Government Policy, Export Figures Cannot Be Published.

Government Inquiries

The following prime contracts are pending, with closing dates for bids as indicated. QR refers to quantity required. Bidding forms on these items can be obtained only by wiring, mentioning schedule number, to the Procurement Branch of the service heading the list of requirements. Field offices of Contract Distribution Branch, WPB, generally have available for inspection and examination, schedules, invitations, specifications and drawings (where required) concerning these contracts.

BUREAU OF SUPPLIES, ACCOUNTS NAVY DEPARTMENT, WASHINGTON

80—Augers, bits, wood boring, QR-Various quantities of misc. sizes. Bids Feb. 5.

81—Chisels, gouges, knives, wood boring; knives; QR-Various quantities of misc. sizes. Bids Feb. 5.

121—Machines, grinding, universal, self-contained, size 14 by 60 inches centers, complete with motor and controller and spare parts and wrenches, QR-2. Bids Feb. 3.

122—Wrenches; pocket, adjustable, screw, set-screw, socket, structural, and spark plug, or misc. quantities of various sizes. Bids Feb. 5.

123—Wrenches: adjustable, box, engineer's, and pipe, QR-Large. Bids Feb. 5.

127—Cleats, standard, composition, N-r, drop-forged, 7 inch size, QR-3000. Bids Feb. 5.

130—Dogs, flat, steel, Grade BW, galvanized, undrilled, QR-7,500; Dogs, shipwright, steel Grade BW, galvanized, 14¾" over-all, QR-20,000. Bids Feb. 5.

144—Chain, cable, stud link, die lock, 15 fathom shots, and shackles, chain, detachable links, QR-598. Bids Feb. 6.

93—Twist drills: large quantities of numerous types and sizes. Bids Feb. 5.

139—Pumps: spray, portable, hand operated, QR-550. Bids Feb. 6.

146—Countersinks: various types and sizes, QR-large. Bids Feb. 5.

157—Zinc: slab (spelter), QR-362,000 lbs. Bids Feb. 3.

169—Adapters, QR-25,000. Bids Feb. 3.

161—Metal: expanded, steel, galvanized, in sheets 6 x 8', various widths of opening and thicknesses, QR-large. Bids Feb. 5.

162—Copper tubing: seamless, in nominal stock lengths of 20', 1.125 outside dia. x 0.065" wall thickness, QR-1,000,000'; hard drawn, QR-500,000'. Bids Feb. 3.

165—Crucibles: without covers, sizes number from 20 to 275, QR-1932. Bids Feb. 5.

9830—Windlasses: and spare parts, QR-12. Bids Feb. 3.

94—Twist drills: QR-Misc. quantities of numerous types and sizes. Bids Feb. 5.

147—Reamers: QR-Misc. quantities of numerous types and sizes. Bids Feb. 5.

164—Food carrier frames: container, food, corrosion resisting steel, 4 qt. and covers, containers, QR-85,180; frames, QR-13,100; covers, QR-9700. Bids Feb. 5.

172—Iron: pig, foundry, QR-approx. 2400 tons. Bids Feb. 5.

178—Barber chairs: Type No. N-20, for shipboard use, QR-170; Revolving surgeons' stools; metal, Type N-18, QR-200. Bids Feb. 5.

185—Phenol: QR-980,000 lbs. Bids Feb. 3.

194—Steel: Grade BW, black, bar, for reforging, 1¾" to 18" rd., QR-about 651,000 lbs.; semi-finished, bar, round, dia. 10", length 10', QR-130,000 lbs. Bids Feb. 10.

227—Portable pumps: submersible, 440 volt, alternating current and spare parts, QR-150. Bids Feb. 5.

203—Wire, sweep, ½" dia. 6 x 19 high-grade plow steel wire rope, galv., 1800' long, from pull to pull, one end whipped, one end with thimble, QR-1350. Bids Feb. 3.

GENERAL PURCHASING OFFICER PANAMA CANAL, WASHINGTON

5924—Drills (twist, stone, ratchet and breast), countersinks and drills, chisels (woodworkers' and machinists'), dies (bolt and split), bits (auger, machine and wood-boring), blades (hack saw and scythe), bars (claw, lining and wrecking), bolt clippers, clamps, ratchet braces, ship augers, tube expanders, blacksmiths' anvils, chopping axes, wing dividers and tool bags, QR-Misc. quantities of 250 items. Bids Feb. 3.

5926—Diestocks, taps (hand and pipe), reamers (hand and machine use), drill sleeves, drill sockets, files (American standard and Swiss pattern), wrenches (engineers', structural, monkey, pipe and tap), hammers (machinists' and sledge), pliers (combination and gas), cutting punches, stamping letters, and bench vises (domestic and machinists), QR-Misc. Bids Feb. 5.

5931—Steel windows, commercial pivoted, QR-17. Bids Feb. 3.

Sub-Contract Opportunities

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

New York office, Contract Distribution Branch, WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-32: Brooklyn manufacturer of thermostatic and pressure control instruments wants a subcontractor to do work on thermometer wells. Work amounts to about $10,000. Material is monel metal; quantity several thousand; machines needed, turret lathes (No. 3 Bardons & Oliver, No. 4 Warner & Swasey or size 1½ Jones & Lamson).

S-33: New York City manufacturer now making adapters for 155 mm. shells wants subcontractors who can furnish 3-inch automatic screw machines for work on seamless tubing or turret lathes to machine 3-inch forgings. Quantity 355,000 pieces.

S-34: Long Island City machine tool company is seeking subcontractor with centerless grinder facilities capable of grinding hard chromium plated bushings down to .0005 of the entire O.D. The bushings vary from $\frac{7}{16}$-inch to 1½-inch diameter and from $\frac{1}{2}$ to 3⅛-inch length. Quantity 100,000 in lots of 500.

S-35: Connecticut manufacturer of automatic machinery is seeking subcontractor capable of cutting a spline shaft to tolerance of .0005. Material is steel, quantity 25 to 100. Requires power hack saw, turret lathe, centering machine, spline cutter or planing mill, heat treating facilities, Rockwell testing and Magnaflux equipment and cylindrical grinder.

S-36: New York City manufacturer of spark plugs is seeking subcontracting facilities capable of quoting on quantities of 25,000, 50,000 or 100,000 on a number of spark plug parts. Items are elbow and shield bushings, elbow nut, lower and upper heat bridges, shield barrel and shell blank. Materials include brass, copper and steel, tolerances .01 to .005. Requires automatic screw-machines with four or six spindles.

S-37: New York City manufacturer of switchboards wants to subcontract the following items: Fuse block, 600 amp, 200 volt knife switch, back connected, 800 amp, 250 volt; knife switch, 3-hole single-throw fusible, 600 amp, 250 volt. Material, copper, will be furnished. Requires turret lathes, 1¼-inch automatic screw machines, planing mill, blanking machine, punch press, drill press, and stamping or swedging machines.

Cleveland office, Contract Distribution Branch, WPB, Union Commerce building, is seeking contractors for the following:

82-122: Steel casting source wanted to furnish casting of two parts: Arm, 20-inches long, 4½ to 5-inches wide, with bosses 3½-inches thick, weighing 53 to 55 pounds each, 400 per day. Quantity unlimited; lever, 28 to 30 inches across bottom tapering 2 to 4 inches, weighing 42 to 44 pounds each, 200 per day. Quantities unlimited. Also complete machining. Physicals include 150,000 tensile, 125,000 yield, 10 per cent elongation, 25 per cent reduction in area.

83-122: Machine tool and assembling facilities wanted to produce 100 sets of component parts and sub-assemblies for motor mounts, machine gun mounts and canopy. Small drills, screw machines, lathes, bending, forming, welding and riveting. Tolerances commercial. Prints on file.

8.1 Per Cent Increase in Carloadings Forecast

■ Freight car requirements for the first quarter this year will be 8.1 per cent greater than loadings in comparable period last year, according to estimates by the regional shippers' advisory boards.

Total requirements are set at 6,054,328, compared with actual loadings of 5,601,422 in the first three months of 1941.

Ore and concentrates are expected to take 177,993 cars, an increase of 7.5 per cent; iron and steel, 618,907, a 7.3 per cent increase; machinery and boilers, 49,001, up 21.1 per cent; and agricultural implements, 25,721, or a decrease of 13 per cent.

■ Sherwin-Williams Co., Cleveland, has adopted returnable steel drums to be used on all shipments of industrial finishes and solvents, instead of the single-trip containers formerly used. Change is designed to conserve steel. Many intermediate sizes have been eliminated from the company's consumer line.

MEN of INDUSTRY

■ **J. D. McKNIGHT** has been named assistant district manager of Allegheny Ludlum Steel Corp.'s Detroit office. He has been identified with the company's Detroit staff six years, having joined the former Allegheny Steel Co. in 1936. Before that he was associated with the Murray Corp. of America, Detroit, in various plant and sales capacities.

♦

F. D. Carroll has been appointed district sales manager, Dallas territory, Youngstown Sheet & Tube Co., with headquarters at 610 Continental building, Dallas, Tex.

♦

Frank A. Stivers has been elected president, Hoover Ball Bearing Co., Ann Arbor, Mich., succeeding the late Walter C. Mack. Mr. Stivers had been first vice president of the company since its organization in 1913.

♦

Andrew Thompson has been named manager of the Boston branch of Hewitt Rubber Corp., Buffalo. He succeeds **Fred G. Phillips,** who has retired after 36 years of service.

♦

Thomas S. McEwan, Chicago district manager, contract distribution division, War Production Board, has resigned, effective Feb. 1. His work will be handled temporarily by **Joseph L. Overlock,** recently named Illinois state director of the division.

♦

E. F. Myers was elected president, treasurer and general manager, Ironton Fire Brick Co., Ironton, O., at the company's annual meeting recently. Other officers elected were **C. E. Bales** and **W. P. Lewis,** vice presidents, and **William D. Lewis,** secretary.

♦

Ferdinand Cook, director and secretary, Egleston Bros. & Co. Inc., Long Island City, N. Y., recently was tendered a dinner and reception by officers and employes of the company, in recognition of 51 years continuous service. Starting with Egleston as a clerk in 1890, Mr. Cook became director and secretary in 1918. He was presented with a gold watch, suitably engraved, in honor of his long service.

The company is one of the oldest steel warehouses in the country, having been established in 1829 as an "iron shop."

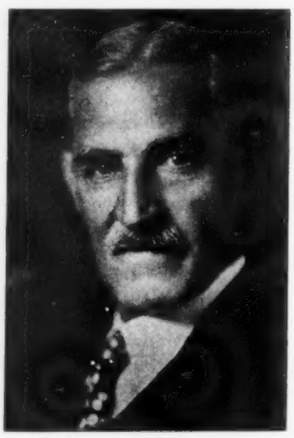
J. D. McKnight

♦

Paul Allen, chief engineer, Inland Steel Co., Ishpeming, Mich., has resigned to join National Lead Co. in Tahawus, N. Y., where he will be interested in the development of titanium oxide. He will be succeeded as chief engineer by **Peter Ribotto,** now engineer for Inland at Sherwood and Ravenna-Prickette mines in Iron county.

♦

Martin Fladoes, vice president in charge of sales and a director, Sivyer Steel Castings Co., Milwaukee, has been elected president, to succeed the late L. S. Peregoy. Associated with the company since 1920, Mr. Fladoes has served successively as an apprentice in the foundry, salesman, sales manager, and in 1930 became vice president in charge of sales.



Ferdinand Cook

Harold L. Holtz, a vice president of Sivyer, has been elected to the board of directors.

♦

Ralph E. Jamison, president, Jamison Coal & Coke Co., Greensburg, Pa., has been elected president, Western Pennsylvania Coal Operators' Association. **George H. Love,** president, Union Collieries Co., Oakmont, Pa., has been named vice president, and **Byron Cannon** has been re-elected secretary-treasurer.

♦

John R. Hoover has been appointed manager of synthetic sales, B. F. Goodrich Co., Akron, O., succeeding **Dr. H. E. Fritz,** recently named director of research. Formerly manager of rubber-lined equipment sales, Mr. Hoover is succeeded in that post by **Herman C. Klein,** heretofore sales engineer in that department.

♦

William H. Klett has joined the export staff of Marmon-Herrington Co. Inc., Indianapolis, in charge of Latin American business. His automotive experience includes management of a large distributing firm in Mexico City and many years as district manager in Central and South America for several automobile manufacturers.

♦

George Eglinton has resigned as sales manager, Wickman Corp., Detroit, to return to his former position as vice president and general manager, Lincoln Park Tool & Gage Co., Lincoln Park, Mich., as a result of increased demands upon the Lincoln Park organization due to the war program.

T. B. Carpenter has become sales manager of Wickman Corp. Identified with the machine tool industry many years, Mr. Carpenter had been associated with the National Automatic Tool Co., Richmond, Ind., the past seven years, during which time he was a sales engineer in the company's Detroit and Chicago offices, and also spent some time in Paris, France, as European representative. Mr. Carpenter was one of the founders and on the original board of di-

rectors, American Society of Tool Engineers. During 1933-34 he served as president of the society.

♦

Ben Regan has been appointed executive secretary, general salvage division, Bureau of Industrial Conservation, War Production Board, Chicago. He will take an indefinite leave of absence from the investment firm of Hornblower & Weeks, Chicago, with which he has been associated 14 years. With offices in the Civic Opera building, Mr. Regan will co-ordinate all salvage activities in Chicago and downstate Illinois.

♦

Paul Lindberg has been appointed rolling mill superintendent for Rotary Electric Steel Co. (Michigan), Detroit. He has had many years of experience in the steel mill field.

♦

Homer L. Shaw has been appointed a research engineer, Battelle Memorial Institute, Columbus, O., and has been assigned to research in metallurgy. Mr. Shaw formerly was associated with Jones & Laughlin Steel Corp. at its Aliquippa, Pa., plant.

♦

J. G. Green, since January, 1940, assistant sales manager, Louis Allis Co., Milwaukee, has been made assistant general manager, Storage Battery Division of Philco Corp., Trenton, N. J.

♦

T. D. Hudson, formerly purchasing agent and assistant auditor, Pittsburgh-Conneaut Dock Co., Conneaut, O., joined the purchasing staff of American Steel & Wire Co., Cleveland, Feb. 1, as assistant to **Frank E. Chesney,** purchasing agent. Mr. Hudson had been associated with the Pittsburgh-Conneaut company 26 years.

DIED:

■ **George Ashley Tomlinson,** 76, president, The Tomlinson Fleet, Cleveland, in Pasadena, Calif., Jan. 26.

One of the great figures in Great Lakes shipping, Mr. Tomlinson also was active in railroad, finance, philanthropy and sports. As a youth he was a cowboy in Wyoming, a performer in Buffalo Bill Cody's wild west troupe, and later a newspaper reporter and editor.

Mr. Tomlinson entered the shipping business as a vessel agent in Duluth, Minn., in 1892. He built his first lake freighter in 1901, and gradually acquired a fleet that at one time included 28 vessels.

In the early 1930's he became associated with the Van Sweringen brothers in Cleveland. When the latter's railroad empire began to fall they appealed to him. He purchased collateral for loans the brothers had floated with investment bankers and gained a large interest in the system which operated 28,000 miles of track.

In addition to heading the fleet which bears his name, Mr. Tomlinson at the time of his death was chairman of the Pere Marquette railroad, a director of the Wheeling & Lake Erie railroad, Goodyear Tire & Rubber Co. and the Cleveland Baseball Co. Within the past few years he had retired as chairman of the American Shipbuilding Co.; president of the Great Lakes Towing Co.; chairman of the Missouri & Pacific railroad; president, Cleveland & Buffalo Transit Co.; and other shipping and industrial affiliations.

♦

S. Fahs Smith, 77, president, S. Morgan Smith Co., York, Pa., Jan. 19, at his winter home in Palm Beach, Fla.

♦

Charles E. Ellicott, 80, founder of Ellicott Machine Corp., Baltimore, and its president until two years ago, Jan. 14, in that city.

♦

William B. McEwen, 60, assistant comptroller in charge of statistics, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and employed by the company 40 years, Jan. 16, in that city.

♦

Dr. Arthur W. Wilson, 74, president, Wilson Steel & Wire Co., Chicago, until his retirement ten years ago, Jan. 22, at his winter home in Los Angeles.

♦

William M. Scudder, 65, retired vice president, American Radiator Co., Chicago, Jan. 21, in Rochester, Minn.

♦

Thomas J. Connor, 48, vice president and a director, Caterpillar Tractor Co., Peoria, Ill., in that city, Jan. 23.

♦

Edward C. A. Von Campe, 62, manager, New York office, Standard Tool Co., Jan. 23, at his home in Manhasset, Long Island. He had been with the tool company 40 years.

♦

Floyd Kirkland Mays, 55, vice president, Peerless Equipment Co., Chicago, Jan. 23, in that city.

♦

John Clarke Howe, 70, founder and president, Howe Mfg. Co., Cleveland, in that city, Jan. 25. He organized the company in 1936 to manufacture a self-oiling roller chain which he invented.

♦

Hiram Davis, 71, former superintendent, Newburgh works, American Steel & Wire Co., Cleveland, Jan. 25, in that city. Before his retirement eight years ago, Mr. Davis had been employed by the company nearly 50 years.

Founders Advised To Seek War Contracts

■ Closer knit organization of foundrymen to promote the use of castings in war work was urged by Frank G. Steinebach, editor, *The Foundry,* Cleveland, before the New Jersey Foundrymen's Association, at the Downtown Club, Newark, last week. He emphasized that if the industry as a whole did not make a stronger fight for the war business it knew it was capable of doing it would lose important position not only for duration of the war but for a period to follow.

Stanley G. Oppenheim, WPB Priority Division, New York, discussed recent developments in foundry priority procedure and emphasized the need for developing a more adequate supply of scrap. He regarded the scrap situation as critical and suggested that the foundry operators, if they believe they are under a disadvantage in competing with steel mills for material under the latest OPA ruling, approach Washington for an adjustment, based on the economic importance of their industry to the war effort.

Mr. Steinebach predicted the time was not far off when foundrymen would be unable to obtain pig iron on a B priority rating. Acute scarcity of scrap, he said, is throwing a constantly increasing burden on pig iron producers.

He presented unofficial figures showing the proportion of pig iron allocated against B orders since the beginning of the allocation program. In September, about 7.8 per cent of the total distribution went to the B classification; in October, 9.4; November, 9.5; December, 8; and January, this year, 7.6. The speaker thought the downward trend would continue.

In view of this, foundries, particularly the gray iron foundries, should seek war work. He advised foundrymen to make a careful study of war requirements and of the industry's facilities. Much could be gained by reviewing needs of machine tool builders. He urged the use of existing facilities to the utmost rather than make it necessary for the government to stimulate new plant construction.

■ Considerable capacity for production of grey iron castings up to 50 pounds and for nonferrous castings in brass, bronze and aluminum up to seven or eight-inch diameter is available in the Lancaster, Pa., district, it is reported by Arthur K. Barnes, manager of Division of Contract Distribution, OPM, 655 Woolworth building, Lancaster.

All Aluminum To Go for War, Except in 15 Essential Products

WASHINGTON

■ ALL aluminum has been marshaled for war by Production Chief Donald M. Nelson with the issuance of Conservation Order M-1-e.

The order prohibits the use of aluminum in any manufacture except on war contracts and the items specifically named in the order. The only exception is that aluminum authorized by the director of priorities after Oct. 31, and prior to the effective date of the order may be used for the specific purpose set forth.

Only 15 uses of aluminum are permitted, most of them restricted to low grade aluminum which has not been debased.

Anhydrous aluminum chloride may be produced only for the manufacture of dyes for war textiles, high octane gasoline, tear gas, nylon or pharmaceuticals.

The steel industry may use aluminum as a de-oxidizer or alloying agent, under specific restrictions. Restrictions also are placed upon its use in all other alloy operations.

Commercial aircraft makers cannot use aluminum except on ratings of A-10 or higher.

Containers for intravenous solutions and blood, welding rods and x-ray tube housings may be produced.

Other permitted uses are:

Condensers for radio sets, provided they replace defective ones in existing sets and do not go into new sets.

Match plates, patterns and snap flasks, provided they are used on orders with ratings of A-1 or higher.

Orthopedic equipment, where light weight is vital.

Pistons for engines of trucks one-and-a-half tons or over, heavy duty tractors, diesel engines and engines for portable fire-fighting equipment. Replacement of worn out or defective aluminum parts, provided that the old parts are returned by the consumer.

Aluminum has been under strict control since early last year, but its use was not previously restricted to such a narrow list of products.

War Chemical Industry Granted High Ratings

War chemical industry will receive assistance of high priority ratings in obtaining necessary repair, maintenance and operating supplies.

Preference rating order P-89 assigns an A-1-a rating to deliveries of materials to repair actual breakdowns; A-1-c to materials required to avert immediate threatened stoppages, and A-3 to the procurement of materials for other repairs, maintenance and operation.

Before applying any of the ratings assigned by the order, a manufacturer must file with the Chemicals Branch a statement setting forth certain required information, and must be assigned a serial number under the order. Serial numbers will be assigned only to companies whose products are being used for war or essential civilian purposes.

Chinese Trading Agency To Approve Exports From U. S.

Generalissimo Chiang Kai-shek has requested, through the Chinese ambassador, that the Universal Trading Corp., official agency of the Chinese government, be granted the privilege of approving proposed exportations purchased in the United States and consigned to unoccupied China.

Acting upon this request, the Board of Economic Warfare, Office of Export Control, has announced that henceforth no export license applications covering proposed exportations to unoccupied China will be considered by it unless such applications bear the official stamp of the Universal Trading Corp.

In addition, the unlimited license held by the Universal Trading Corp. has been amended to authorize the exportation to unoccupied China of certain additional critical commodities vital to the Chinese war effort. These commodities are copper, certain types of machine tools, nickel, low grade petroleum products.

OPA Extends Protection to Latin American Republics

OPA will extend to the Latin American republics the same protection as is provided domestic buyers, Leon Henderson, administrator, announced.

He added that every effort will be made to see that price ceilings do not interfere with the normal flow of exports. Particular care will be taken to see that export differentials in the ceilings provide for the higher costs of doing business beyond the borders of continental United States and, therefore, do not discriminate against the exporter.

OPA Asks Steel Forging Prices Be Held at Oct. 10 Levels

Steel forgings manufacturers last week were asked to maintain prices at the Oct. 10 levels, following a conference of manufacturers and OPA officials.

"Business as Usual," Despite Jap Bombs

■ **HONOLULU, T. H.: Although not struck by a bomb, a repair shop at the airport here was wrecked as shown by this picture when a missile exploded nearby. Next day the garagemen chalked "Business as Usual" on the doors. NEA photo**

Canadian Car & Foundry To Build 1000 Curtiss Navy Dive Bombers

TORONTO, ONT.

■ CANADIAN Car & Foundry Co. Ltd. will receive an order totaling $60,000,000 for about 1000 Curtiss Navy dive bombers, C. D. Howe, Minister of Munitions and Supply, announced. He stated the order will occupy the full facilities of the company's plants at Fort William, Ont., and at Point St. Charles, Que., until late in 1944. The contract calls for 12 months of sustained peak production with a maximum output of 80 planes per month. Preliminary tooling-up is now in progress and it is expected the first plane will be completed early in 1943.

British Columbia shipyards have undertaken almost half of Canada's shipbuilding program contracted for by the government from September, 1939 to May, 1941, totaling $373,586,702, according to information submitted in the House of Commons.

Department of Munitions and Supply, for the week ended Jan. 13 awarded 4924 war contracts to the value of $24,486,265. Most important awards on the list were for shipbuilding, $10,487,542. Land transport contracts were valued at $2,973,824 and aircraft, $2,769,855. Only one order was placed in the United States during the week, valued at $5356. Orders include:

Shipbuilding: Halifax Shipyards Ltd., Halifax, $180,777; Canadian International Paper Co. Ltd., Montreal, $24,786; Canadian Vickers Ltd., Montreal, $95,177; Hydraulic Machinery Co. Ltd., Montreal, $66,420; Dominion Engineering Works Ltd., Lachine, Que., $4,702,320; Stephens-Adamson Mfg. Co. of Canada Ltd., Belleville, $289,843; John Inglis Co. Ltd., Toronto, $2,382,480; James Morrison Brass Mfg. Co. Ltd., Toronto, $65,960; Smart-Turner Machine Co. Ltd., Hamilton, $55,879; Star Shipyard (Mercer's) Ltd., New Westminster, B. C., $101,700; Webb & Gifford Ltd., New Westminster, $90,887; Ross & Howard Iron Works Co. Ltd., Vancouver, $105,499; Vancouver Engineering Works Ltd., Vancouver, $723,579; Vancouver Iron Works Ltd., Vancouver, $1,602,326.

Land transport: General Supply Co. of Canada Ltd., Ottawa, $49,334; General Motors Products of Canada Ltd., Oshawa, $363,888; Dunlop Tire & Rubber Goods Co. Ltd., Toronto, $554,493; Goodyear Tire & Rubber Co. of Canada Ltd., Toronto, $877,320; Firestone Tire & Rubber Co. of Canada Ltd., Hamilton, $1,091,865; Ford Motor Co. of Canada Ltd., Windsor, $36,924.

Aircraft: Fairchild Aircraft Ltd., Longueuil, Que., $14,949; Aviation Electric Ltd., Montreal, $215,100; Canadian Vickers Ltd., Montreal, $15,958; Railway & Power Engineering Corp. Ltd., Montreal, $52,748; Switlik Canadian Parachute Ltd., Montreal, $635,670; Duplate Canada Ltd., Ottawa, $23,781; Irvin Air Chute Ltd., Ottawa, $621,814; Link Mfg. Co. Ltd., Gananoque, Ont., $527,219; De Haviland Aircraft of Canada Ltd., Toronto, $768,488; Fleet Aircraft Ltd., Fort Erie, $24,755; Cockshutt Plow Co. Ltd., Brantford, $79,199; Standard Machine Works, Winnipeg, Man., $5274.

Instruments: Instruments Ltd., Ottawa, $24,192; Ontario Hughes-Owens Co. Ltd., Ottawa, $93,810; Research Enterprises Ltd., Leaside (Toronto), $9975.

Electrical equipment: Canadian Marconi Co., Montreal, $13,140; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $6000; Small Electric Motors (Canada) Ltd., Leaside, $79,500; Exide Batteries of Canada Ltd., Toronto, $7164.

Tools: Standard Tube Co. Ltd., Ottawa, $12,081; E. & A. Gunther Co. Ltd., Brantford, $9260.

Fire fighting equipment: Fog Nozzle Co. of Canada Ltd., Montreal, $6562; La France Fire Engine & Foamite Ltd., Toronto, $60,706.

Metals: Metals & Alloys Ltd., Toronto, $22,800.

Munitions: Creighton & Smith Motors, Fredericton, N. B., $251,747; Government of United Kingdom, Ottawa, $33,260; Transport Dept., Ottawa, $6480; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $128,802; Canadian Acme Screw & Gear Ltd., Toronto, $142,560; Robert Bell Engine & Thresher Co. Ltd., Seaforth, Ont., $61,425.

War construction projects: Bennett & White Construction Co. Ltd., Calgary, Alta., $382,421; Shoquist Construction Ltd., Saskatoon, Sask., $190,000; Assiniboia Engineering Co. Ltd., and Dutton Bros. & Co., Winnipeg, $86,411; W. C. Brennan Contracting Co., Hamilton, $110,109; Doran Construction Co. Ltd., Ottawa, $48,000; Milne & Nicholls Ltd., Toronto, $223,606; A. & C. Janin Ltd., Montreal, $493,000; Consolidated Construction Co. Ltd., Montreal, $88,745; Atlantic Construction Co., Halifax, $86,030; Standard Construction o., Halifax, $61,500.

Miscellaneous: Moncton Electricity & Gas Co. Ltd., Moncton, N. B., $35,509; Moncton Plumbing & Supply Co. Ltd., Moncton, $5156; Montreal Locomotive Works Ltd., Montreal, $11,774; Ideal Stoker Co., Toronto, $11,630; Bennett & Wright Ltd., Toronto, $31,850; John Inglis Co. Ltd., Toronto, $39,376; Supreme Boiler & Engineering Co. Ltd., Toronto, $32,376; E. Leonard & Sons Ltd., London, $16,646; B. Greening Wire Co. Ltd., Hamilton, $17,902; Miner Rubber Co. Ltd., Granby, Que., $266,048; Canadian General Rubber Co. Ltd., Galt, Ont., $46,137; Gillette Safety Razor Co. of Canada Ltd., Montreal, $9000; Coulter Copper & Brass Co. Ltd., Toronto, $27,383; Viceroy Mfg. Co. Ltd., Toronto, $21,200; General Motors Sales Corp., Leaside, $11,882; Acme Office Supplies Ltd., Ottawa, $19,858; Ottawa Typewriter Co. Ltd., Ottawa, $19,858; E. B. Eddy Co. Ltd., Hull, Que., $15,910; Lockerbie & Hole Ltd., Edmonton, $11,000; Steacy Sheet Metal Works, Calgary, $5000; Clare Bros. Western Ltd., Calgary, $41,000; San-O-Heat Ltd., Vancouver, $8000; Calgary Power Co. Ltd., Calgary, $6000.

Ol' Red Wabbler says:
Ever know a big tough lookin' bozo who was easy to hurt? Well, rolls are kinda like that. Some of 'em are almost diamond hard, but you still gotta treat 'em gentle. Don't bang 'em around or drop chains or hooks on 'em. A little nick or gouge might hold up a whole mill run and waste a lotta time. I guess I don't have to tell you guys how precious time is these days.
ROLLS ARE TOUGH—
BUT
TREAT THEM GENTLY
MACKINTOSH-HEMPHILL COMPANY

Ordnance Flag, and "E" Awarded 3 Companies

■ Three companies in the Cleveland district received the Bureau of Ordnance flag and Navy "E" pennant last week, in recognition of outstanding performance in production of ordnance *materiel*.

Warner & Swasey Co., Cleveland, manufacturer of turret lathes, was presented awards by Rear Admiral Henry V. Butler, retired, and they were accepted on behalf of the company by Frank A. Scott, former company president, and chairman of the first War Industries Board in World War 1.

Permold Co., Medina, O., manufacturer of permanent-mold aluminum castings, received the emblems from Capt. E. A. Loftquist, U. S. N., chief of staff, Ninth Naval District, Great Lakes, Ill. Acceptance was by E. G. Fahlman, president, for the company, and Walter Maple, for the employes.

The award to Steel Improvement & Forge Co., Cleveland, was made by Admiral Butler and it was accepted by Charles H. Smith, president-treasurer of the company.

All employes of the companies were presented bronze emblems bearing insignia of the Bureau of Ordnance and the Navy "E".

Cartoon Aids War Effort

■ Copies of a cartoon poster with fundamental "don'ts" in the care of rolling mill rolls are being distributed by Mackintosh-Hemphill Co., Pittsburgh, to aid in saving time and vital materials. Drawings are by Hungerford, *Pittsburgh Post-Gazette* cartoonist. "Ol' Red Wabbler," old-time mill operator, says:

"Ever know a big tough looking bozo who was easy to hurt? Well, rolls are kinda like that. Some of 'em are almost diamond hard, but you gotta treat 'em gentle. Don't bang 'em around or drop chains or hooks on 'em. A little nick or gouge might hold up a whole mill run and waste a lotta time. I guess I don't have to tell you guys how precious time is these days."

STEEL

Work a "Sacrifice", or Privilege?

■ ON TUESDAY last week the War, Navy and Labor Departments issued a joint statement calling upon labor and management to place war production upon a 24-hour, seven-day basis immediately.

This, of course, necessitates a relaxation of certain regulations or standards which have been imposed upon employes and employers by the federal government and by numerous states in recent years. In acquiescing to these modifications, the three government departments are merely giving their belated sanction to a move that has seemed inevitable to every employer and employe since September, 1939.

However, in commenting upon the temporary easing of regulations pertaining to the 8-hour day, 48-hour week and one-day-of-rest-in-seven, Secretary of Labor Perkins made the curious and wholly gratuitous observation that labor and management must keep every machine going "regardless of the sacrifice entailed."

This prompts the question as to what Miss Perkins meant by the reference to "sacrifice." Examination of the text of her statement, coupled with the past record of her attitude on matters of employment, makes it fairly certain that she believes that for an employe to work more than eight hours a day, or more than 48 hours in a week, or on more than five or six of the seven days in a week entails a "sacrifice."

This reasoning on the part of the Secretary of Labor probably reveals a fallacious conception of the institution of work itself—a perverted view which has been shared by many others in Washington and which is responsible for many of the impractical and damaging features of the nation's recent labor policies.

She and Robert Wagner and Eleanor Roosevelt and Mary Norton and numerous others—probably horrified by certain sweat shop conditions known to them—have generalized upon those shocking revelations to the point where they have gained a distorted view of what work really is.

They think that work is an ordeal, a punishment, something to be avoided. Hence their fanatical desire to regiment the hours of work and Miss Perkins' bland implication that to work longer or harder "entails a sacrifice."

Employes generally do not share this view, nor does the public. The dictionary defines work as the "exertion of strength or faculties to accomplish something." Most people think that work is an honorable institution. Carlyle said that "all work is noble. . . . A life of ease is not for any man."

Generally speaking, men think of work as an opportunity to serve. They feel that the right to work is one of the inalienable rights embraced in the guarantee of life, liberty and the pursuit of happiness.

They realize too that the opportunity to work does not remain constant. One cannot expect to work as long or as profitably in time of depression as in time of plenty. One expects to work harder and longer in emergency periods than during normal periods.

Therefore when the supreme test comes —when all people wish to do their utmost to defeat invading enemies—men at the bench, machine or desk do not consider it a "sacrifice" to work harder or longer.

Why, they may ask, should Miss Perkins or anyone in Washington think of "sacrifice" in connection with work when Americans in uniform are doing so much with so little at Midway, Wake, Bataan, Rangoon, Macassar, etc.?

E. L. Shaner

EDITOR-IN-CHIEF

Feb. 2, 1942

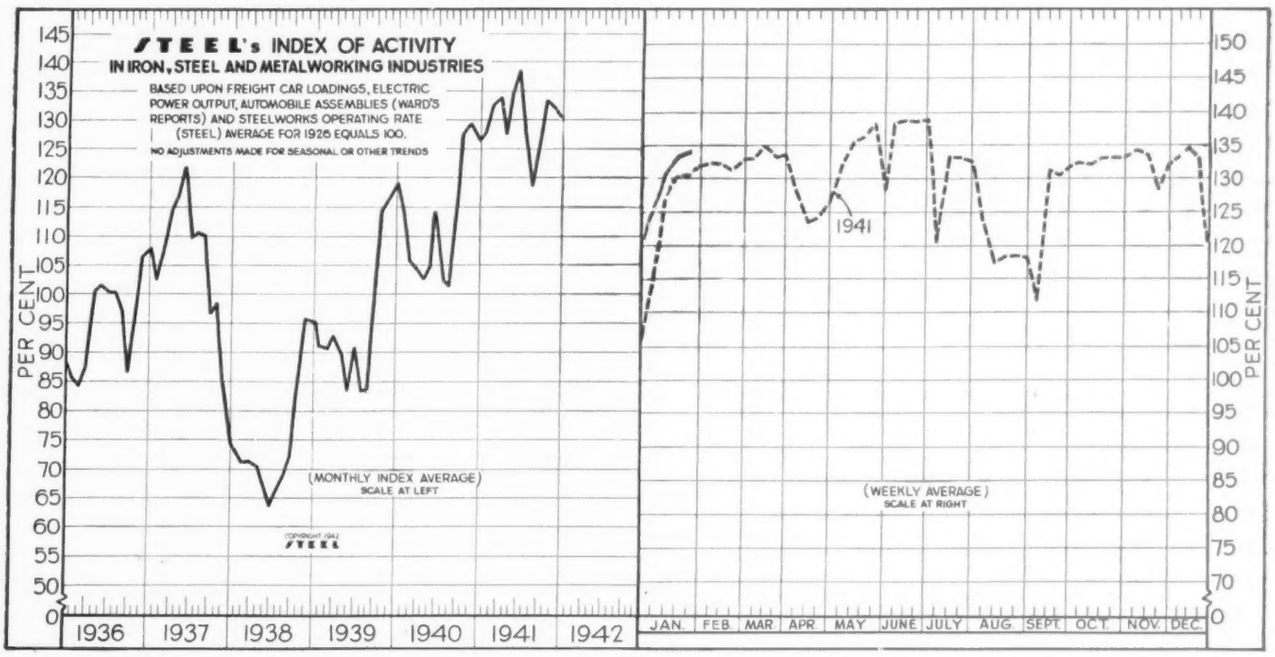
The *BUSINESS TREND*

Index of Activity Edges Upward

■ DURING the week ended Jan. 24, STEEL's index of activity advanced 0.6 point to 133.7. Thus industry has all but regained the losses incurred over the year-end. A relatively small further increase will carry the index above the highest point attained in the latter part of last year—134.8 in the week ending Dec. 13.

The small gain in the week ended Jan. 24 was accounted for by improvements in three of the four indicators composing the index. The national steel rate advanced one point to 97 per cent of capacity. Automobile output totaled 79,930 units compared with 75,025 in the preceding week. Revenue freight car loadings totaled 817,804 cars, a moderate increase from the 811,196 in the preceding week. Electric power consumption at 3,440,163,000 kilowatt hours was off slightly.

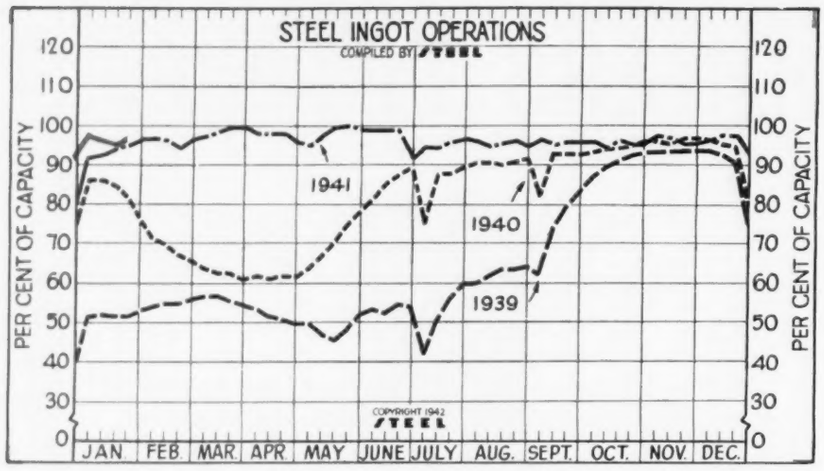
Business now is entering a period in which comparisons with activity a year ago will be illuminating. Industrial production, as measured by the Federal Reserve Board's index, averaged around 160 in the closing months of 1941 as compared with about 140 in the first few months of the year. This indicates a gain of about 15 per cent during the year.


STEEL's INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100.
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
(WEEKLY AVERAGE) SCALE AT RIGHT
1941
1936 1937 1938 1939 1940 1941 1942
JAN. FEB. MAR APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity gained 0.6 point to 133.7 in the week ended Jan. 24:

Week Ended	1941	1940
Nov. 22	128.4	124.7
Nov. 29	132.2	132.6
Dec. 6	133.4	132.5
Dec. 13	134.8	132.6
Dec. 20	132.9	132.4
Dec. 27	120.5	107.5
Week Ended	**1942**	**1941**
Jan. 3	124.7	114.5
Jan. 10	131.2	128.2
Jan. 17	133.1	130.8
Jan. 24	133.7	130.7

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3



Steel Ingot Operations

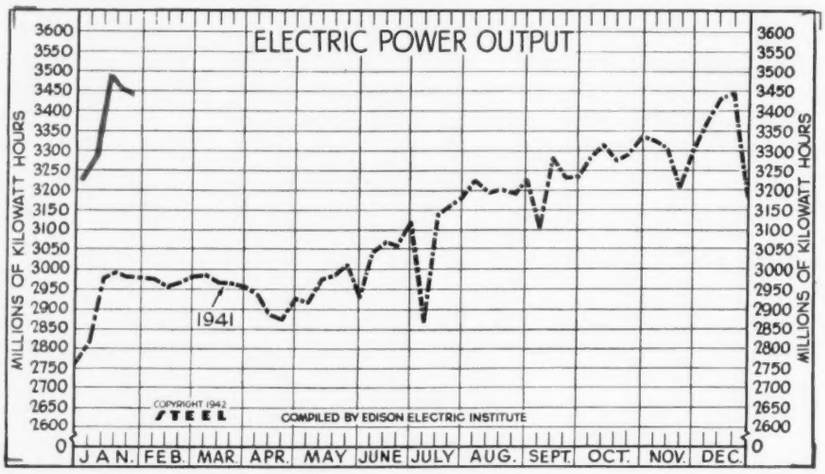
(Per Cent)

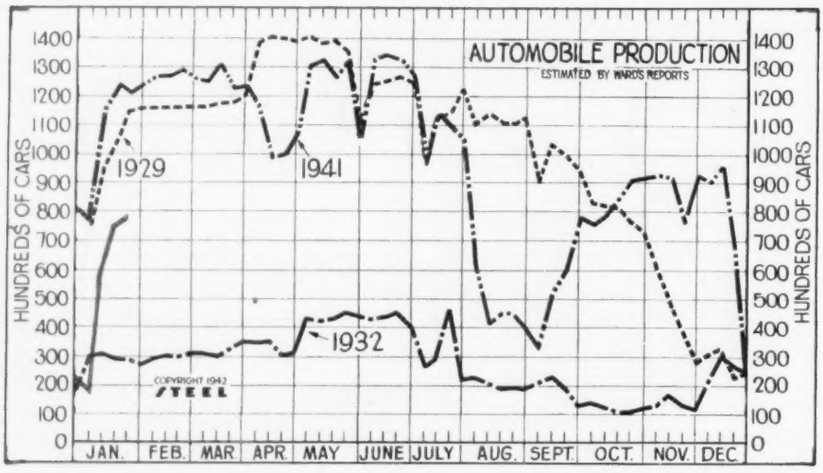
Week ended	1942	1941	1940	1939
Jan. 24....	97.0	95.5	81.5	51.5
Jan. 17....	96.0	94.5	84.5	51.5
Jan. 10....	96.5	93.0	86.0	52.0
Jan. 3....	97.5	92.5	86.5	51.5
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27....	93.5	80.0	75.5	40.0
Dec. 20....	97.5	95.0	90.5	52.0
Dec. 13....	97.1	95.5	92.5	58.0
Dec. 6....	96.5	96.5	94.0	61.0
Nov. 29....	95.0	97.0	94.0	61.6
Nov. 22....	95.5	97.0	93.5	62.0
Nov. 15....	97.0	96.0	93.5	63.0
Nov. 8....	97.5	96.5	93.0	61.5
Nov. 1....	95.5	96.5	93.0	57.5
Oct. 25....	95.5	95.5	92.0	54.5
Oct. 18....	96.5	95.0	91.0	51.5
Oct. 11....	94.5	94.5	89.5	51.5
Oct. 4....	96.0	93.5	87.5	48.5

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
Jan. 24.....	3,440	2,980	2,661	2,340
Jan. 17.....	3,450	2,996	2,674	2,342
Jan. 10.....	3,473	2,985	2,688	2,329
Jan. 3.....	3,287	2,831	2,558	2,239
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27.....	3,234	2,757	2,465	2,175
Dec. 20.....	3,449	3,052	2,712	2,425
Dec. 13.....	3,431	3,004	2,674	2,390
Dec. 6.....	3,369	2,976	2,654	2,377
Nov. 29.....	3,295	2,932	2,605	2,335
Nov. 22.....	3,205	2,839	2,561	2,248
Nov. 15.....	3,304	2,890	2,587	2,325
Nov. 8.....	3,339	2,858	2,589	2,277
Nov. 1.....	3,339	2,882	2,609	2,271
Oct. 25.....	3,299	2,867	2,622	2,284
Oct. 18.....	3,273	2,838	2,576	2,281
Oct. 11.....	3,315	2,817	2,584	2,251
Oct. 4.....	3,290	2,792	2,554	2,229


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
COPYRIGHT 1942 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



Auto Production

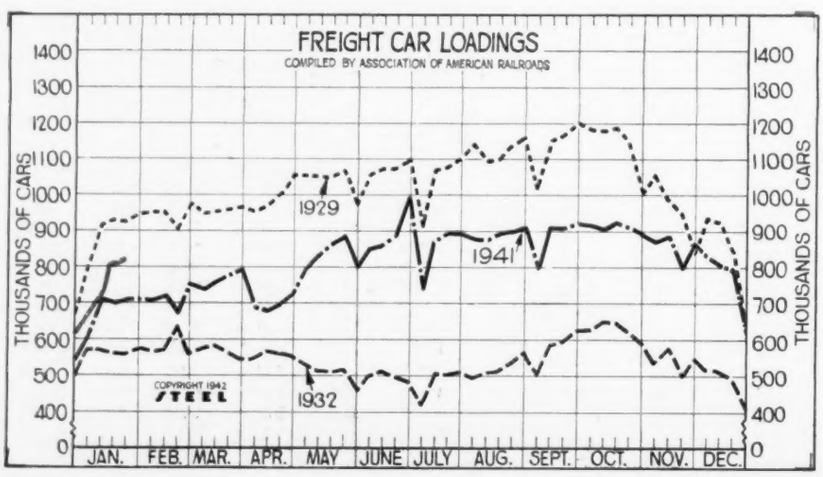
(1000 Units)

Week ended	1942	1941	1940	1939
Jan. 24....	79.9	121.9	106.4	89.2
Jan. 17....	75.0	124.0	108.5	90.2
Jan. 10....	59.0	115.9	111.3	86.9
Jan. 3....	18.5	76.7	87.5	76.7
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27....	24.6	81.3	89.4	75.2
Dec. 20....	65.9	125.4	117.7	92.9
Dec. 13....	96.0	125.6	118.4	102.9
Dec. 6....	90.2	124.8	115.5	100.7
Nov. 29....	93.5	128.8	93.6	97.8
Nov. 22....	76.8	102.3	72.5	84.9
Nov. 15....	93.0	121.9	86.7	96.7
Nov. 8....	93.6	120.9	86.2	86.3
Nov. 1....	92.9	118.1	82.7	80.0
Oct. 25....	91.9	117.1	78.2	73.3
Oct. 18....	85.6	114.7	70.1	68.4
Oct. 11....	79.1	108.0	75.9	50 5
Oct. 4....	76.8	105.2	76.1	37.7

Freight Car Loadings

(1000 Cars)

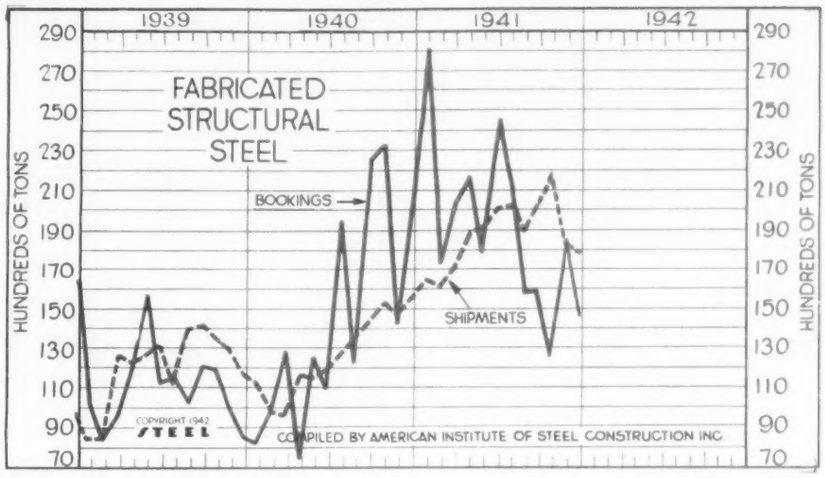
Week ended	1942	1941	1940	1939
Jan. 24	818	711	649	594
Jan. 17.....	811	703	646	590
Jan. 10.....	737	712	668	587
Jan. 3.....	674	614	592	531
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27.....	607	545	550	500
Dec. 20.....	799	700	655	574
Dec. 13.....	807	736	681	606
Dec. 6.....	833	738	687	619
Nov. 29.....	866	729	689	649
Nov. 22.....	799	733	677	562
Nov. 15.....	884	745	771	657
Nov. 8.....	874	778	786	637
Nov. 1.....	895	795	806	673
Oct. 25.....	914	838	834	709
Oct. 18.....	923	814	861	706

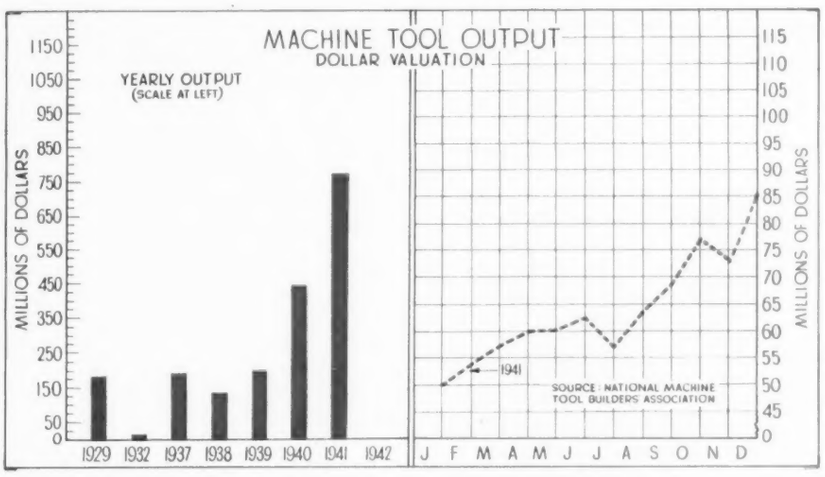


Fabricated Structural Steel

(1000 tons)

	Shipments			Bookings		
	1941	1940	1939	1941	1940	1939
Jan.	164.6	110.9	84.3	281.2	81.7	101.7
Feb.	161.4	97.2	84.4	173.6	98.9	82.7
Mar.	170.2	95.9	125.3	206.1	128.3	95.1
Apr.	189.8	116.3	120.9	218.0	73.8	118.3
May	191.9	115.6	125.9	179.9	126.8	156.9
June	200.5	119.1	130.1	246.9	109.7	111.6
July	203.0	127.1	110.5	214.8	194.9	114.1
Aug.	189.3	134.9	139.7	158.7	122.5	100.9
Sept.	204.1	142.8	140.8	158.8	225.5	121.4
Oct.	217.7	153.2	133.8	128.7	233.1	118.8
Nov.	182.6	147.0	128.2	184.0	141.9	99.3
Dec.	176.1	155.5	116.2	146.4	203.1	84.4
Tot.	2251.1	1515.5	1440.1	2297.0	1748.1	1305.0




MACHINE TOOL OUTPUT
DOLLAR VALUATION
YEARLY OUTPUT
(SCALE AT LEFT)
MILLIONS OF DOLLARS
1929 1932 1937 1938 1939 1940 1941 1942
1941
SOURCE: NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
J F M A M J J A S O N D

Machine Tool Output

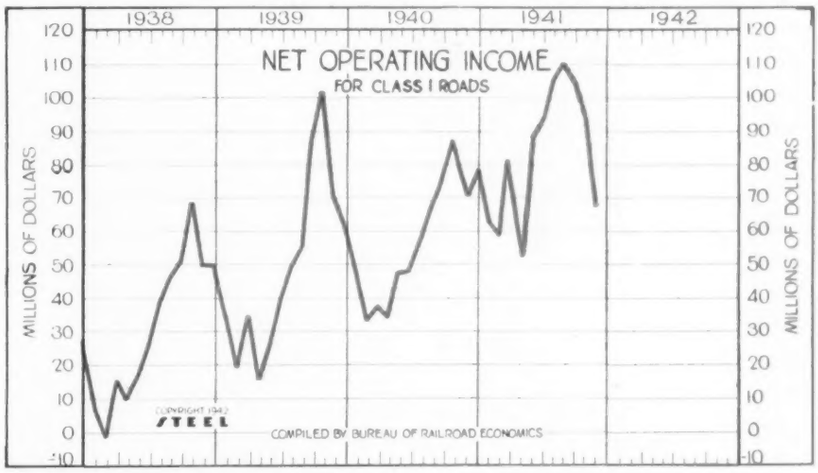
	1941
January	$50,000,000
February	54,000,000
March	57,400,000
April	60,300,000
May	60,800,000
June	63,000,000
July	57,900,000
August	64,300,000
September	68,400,000
October	77,200,000
November	74,600,000
December	85,100,000
1929	185,000,000
1932	22,000,000
1937	195,000,000
1938	145,000,000
1939	210,000,000
1940	450,000,000
1941	775,300,000

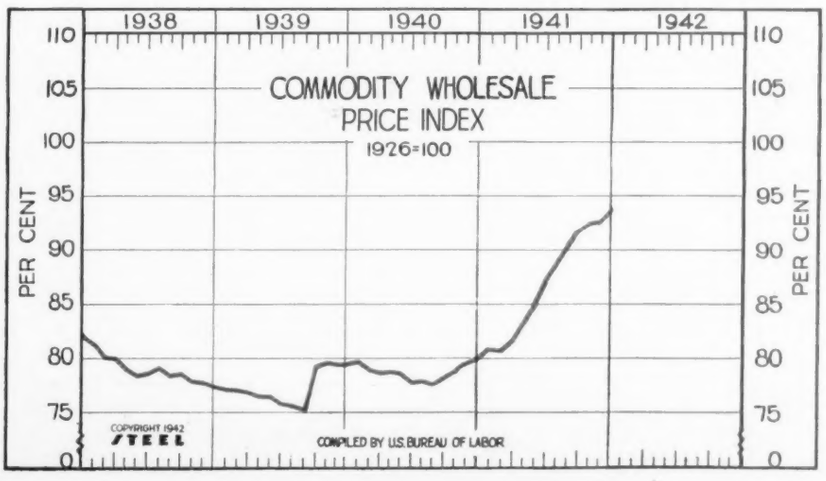
Class I Railroads
Net Operating Income

(Unit: $1,000,000)

	1941	1940	1939	1938
Jan.	$62.36	$45.57	$32.89	$7.14
Feb.	58.49	32.86	18.59	1.91*
Mar.	80.63	36.73	34.32	14.73
April	52.57	33.82	15.32	9.40
May	88.63	47.08	25.10	16.67
June	93.26	47.42	39.10	25.16
July	106.31	57.08	49.01	38.43
Aug.	110.02	66.01	54.59	45.42
Sept.	104.07	74.19	86.43	50.36
Oct.	93.66	86.99	101.62	68.57
Nov.	68.76	72.00	70.41	49.69
Dec.	.....	78.79	60.95	49.37
Average	.....	$56.84	$49.02	$31.02

*Indicates deficit.





All Commodity
Wholesale Price Index
U. S. Bureau of Labor

(1926 = 100)

	1941	1940	1939	1938	1937
Jan.	80.8	79.4	76.9	80.9	85.9
Feb.	80.6	78.7	76.9	79.8	86.3
March	81.5	78.4	76.7	79.7	87.8
April	83.2	78.6	76.2	78.7	88.0
May	84.9	78.4	76.2	78.1	87.4
June	87.1	77.5	75.6	78.3	87.2
July	88.8	77.7	75.4	78.8	87.9
Aug.	90.3	77.4	75.0	78.1	87.5
Sept.	91.8	78.0	79.1	78.3	87.4
Oct.	92.4	78.7	79.4	77.6	85.4
Nov.	92.5	79.6	79.2	77.5	83.3
Dec.	93.5	80.0	79.2	77.0	81.7
Ave.	87.3	78.5	77.1	78.6	86.3

Tripling Production

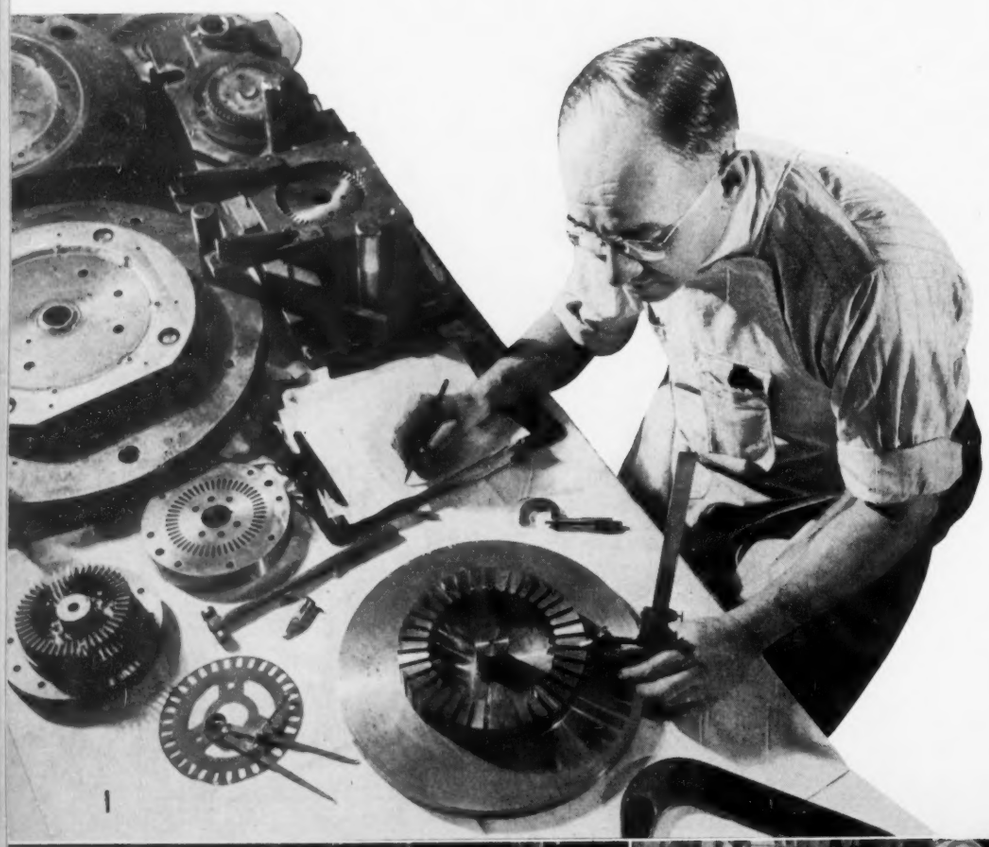
for war needs

By J. V. HUNT
Motor and Generator Section
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

■ TO MEET the need for greatly increased production of all kinds of war *materiel* including airplanes, tanks, guns and ammunition, battleships, etc., every electric motor plant is seeking means to increase its output. Westinghouse Motor Division has succeeded in eliminating many bottlenecks to keep production flowing at a faster pace with the result that its output has been increased several hundred per cent. This increase is largely due to full-time use of automatic equipment formerly employed only part of the 24 hours.

In normal times only about 20 per cent of the Motor Division employes work at night, but now this force has been expanded five times to make a full complement of three shifts, which work around the clock. This program has been aided greatly by the sacrifice of veteran workmen whose willingness to change their working schedules to night shifts provides the experience and talent to guide new night men. To obtain smooth-running production on the night shifts, the percentage of older, experienced workers was increased; supervisors were provided with organization assistants; and the number of night shift inspectors was increased.

In addition, a number of production aids have been worked out to increase the output from the machines and production lines. For instance, **Fig. 3** shows a setup developed for drilling conduit box-attaching holes in motor stator frames. Formerly this was a separate operation which required lifting frames from the conveyor to the drilling machine. Now fixtures have been devised which swing the frame from the conveyor line into the setup shown in **Fig. 3.** Here a 4-spindle Kingsbury head is mounted on the 8-spindle horizontal drill press used for drilling the bracket mounting holes by which the ends or brackets of the motor are held to the frame. By synchronizing the electric controls of these two machines, all 12 holes, including the eight bracket holes and the four conduit attaching holes, are drilled



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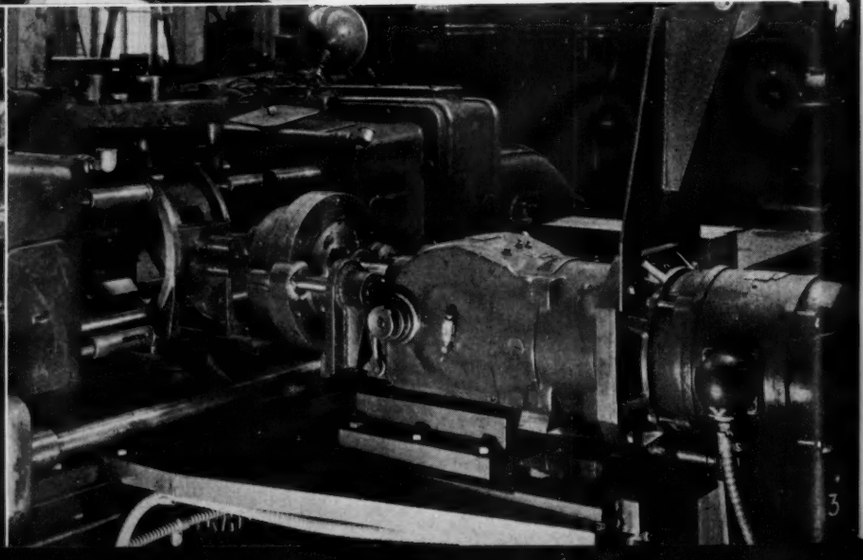

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simultaneously, resulting in a substantial saving in time and in work simplification since this setup entirely eliminates the time formerly needed for drilling the four conduit-attaching holes. **Fig. 3** shows how the 4-spindle Kingsbury head is mounted onto the frame of the 8-spindle horizontal drill press. Note also the separate motor and gear drive employed.

Fig. 1 shows compound dies for stamping out stator and rotor punchings in automatic stamping machines. By increasing the use of automatic stamping machines, it is possible to turn out an enormous number of punchings for stator and rotor cores. Automatic stamping setups formerly run only a few hours per day now are employed almost continuously to turn out the huge volume of sheet steel laminations required.

Stator Winding Facilitated

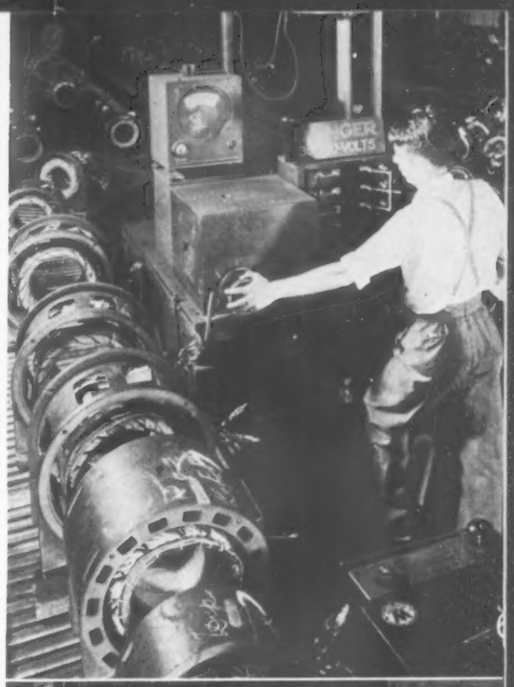
By locating the press, **Fig. 8,** at the point where the stator punchings are assembled and riveted into the primary core units, backtracking is saved as the core can be pressed into the frame immediately without transfer to press department. While the press fit would hold the core in position firmly for all ordinary applications, core is also tack welded on either side of the motor frame as further assurance against any shifting.

Several sheets of treated cloth and heavy mechanical paper, instead of being handled separately, are cemented together into a unit in the unique machine shown in **Fig. 4** to speed winding of motors and assembly of slot cells. This machine assembles the several pieces of material required for the slot cell insulation by applying reinforcing cuff on the edge of each slot cell at the point in the center foreground where the nearest operator is shown supervising the operation. This cuff is reinforced with string and cut off in the automatic press to form the individual slot cells shown in the immediate foreground in **Fig. 4.** At the same time the slot cells are die-formed as shown. The reinforced cuff makes the end of the slot cell so tough that it is practically impossible to tear it by hand. This greatly facilitates inserting the slot cells into the stator cores for winding and thus contributes to greater production.

Another device which greatly facilitates stator winding operations is the use of fixtures and rollers, **Fig. 2,** which permit revolving the stator to any position throughout 360-degree range. The two halves of the fixture are clamped around the stator frame in such a manner that the outer portion of the fixture forms two continuous circular rails on which the frame can be revolved on rollers. The rollers too are mounted on a fixture so the entire arrangement can be rotated around a vertical axis for most convenient working position or to change from one side to the other of the motor.

This fixture greatly facilitates insertion of the coils and insulation, connection of the leads, etc., since it allows the motor to be positioned easily to any point desired. And so this hand labor, which constitutes a large portion of the work of making a motor, is made easier. Girl operators quickly become exceptionally expert in doing this work, but tire easily if much phys-

(*Please turn to Page* 76)



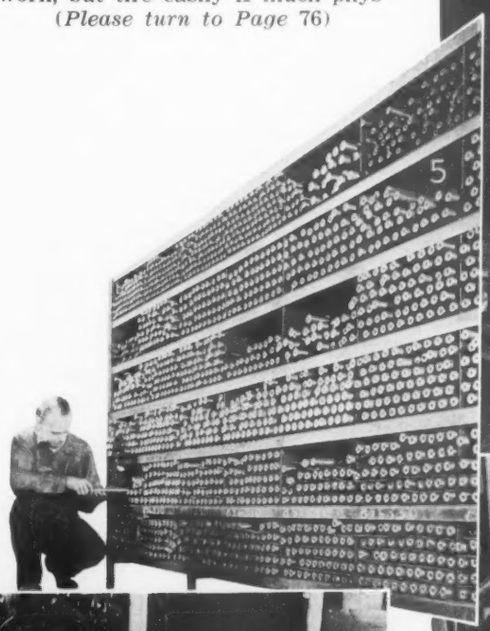


Fig. 1—Modern version of tinner's rolls used to form curved sections from sheet metal. Rolls are 15 feet long, are backed up by needle bearings. Upper roller is only 15/16-inch in diameter

By **ARTHUR A. SCHWARTZ**
Bell Aircraft Corp.
Buffalo

Metalworking and AIRFRAMES

■ NINETY per cent of an airplane structure—fuselage, wings and tail surfaces—is made of sheet duralumin, blanked or cut to shape and formed. The common version of blanking is in terms of punch press work, the forming being done between various types of metal dies. This method has been developed to high efficiency by the automobile industry, giving rise to questions such as "Why don't we produce planes like we build automobiles?"

About the only similarities between an airplane and an automobile are that they are both vehicles and are propelled by gasoline engines. Even here there are dissimilarities because aviation gasoline is quite different from commonly used automobile gasoline.

The automobile owes its popularity to two factors—reliability and low cost. All other manufacturing considerations are secondary. In engineering the motor car, these two factors are of supreme importance; efficiency and weight are considered only after the above mentioned factors have been satisfied.

In airplane design, the priority among factors is in reverse order. Performance—speed, range and rate of climb—is the important thing in airplanes. A tiny pursuit ship, capable of rocketing through the skies at 400 miles an hour and better, must have a cruising range beyond 1000 miles. It must be able to climb miles high in a matter of minutes, and must carry a full complement of cannon and machine guns, together with the necessary ammunition.

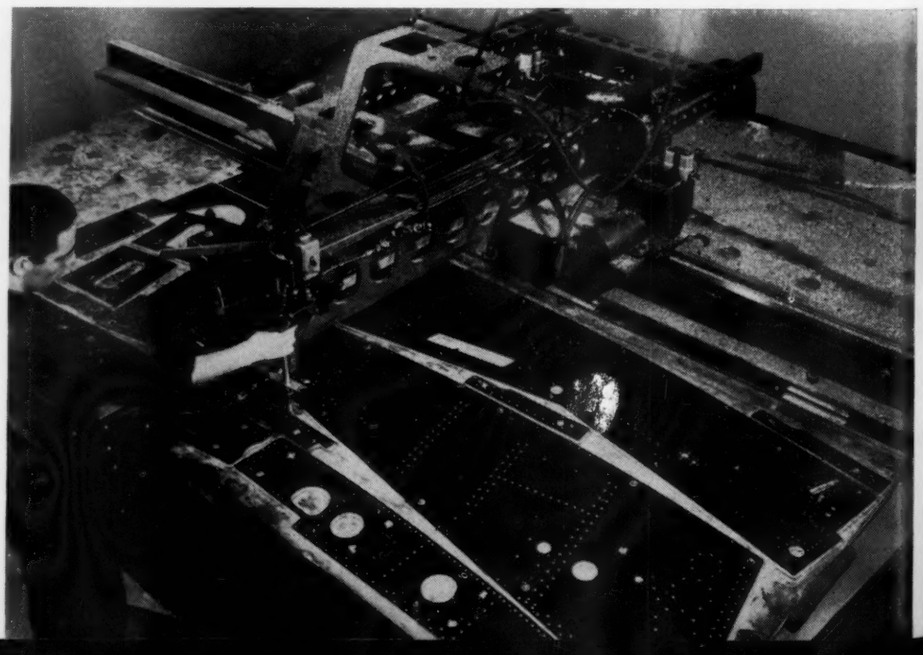
To realize such performance, strength and lightness become the two factors of supreme design importance. All other conditions are submerged. Streamlining and removal of air resistance, while of extreme importance, can be approached only within the limitations of weight and strength.

It is partly because of this difference in values in the automobile and aircraft industries that manufacturing methods are so dissimilar. An automobile does well if its weight is less than 30 pounds per horsepower. Airplanes have about 10 pounds per horsepower. If an automobile were constructed like an airplane, it would weigh about 300 pounds and be powered with from approximately 10 to 20 horsepower.

In the airplane manufacturing plant, tooling always is designed to fit the parts, and material is selected for light weight, strength and durability. In the auto plant, the tooling already available often governs the design of the parts, and material is selected with an eye to machinability and cost.

It should be realized that in the construction of an airplane, designers are unable to add a single new piece of metal without utilizing its strength. This often requires the redesigning of a dozen or more parts, not only to make room for the added piece, but also to make use of it as a structural

Fig. 2—High-speed routing machine with templets bolted to table in foreground and stacks of aluminum parts on table in background



member and thus save some of the added weight by economies in other parts. Speed of production is affected importantly by the speed with which such changes can be made. These changes, incidentally, might affect any one of the thousands of parts in an airplane, and as a result each part is built in lots rather than in continuous production.

This is not to infer that airplanes cannot be built rapidly—that is, rapidly when compared to production rates of even a year ago. But to achieve this speed, special methods of tooling and production have been imperative.

Use Parts of All Shapes

As indicated earlier, the blanking and forming of duralumin is a major phase of manufacturing operations. At the Bell plants, for example, parts vary in size from the shape of a quarter to that of a bed sheet. The smaller parts, up to about 1 square foot in area, are blanked out mainly in punch presses. The company holds patents on a quick-change blanking die made of thin sheet metal, mostly boiler plate, as shown in Fig. 3, below. Frequently one of these dies can be made in less than three hours. They will perform as well as the more expensive dies and will make nearly as many parts as any other dies between grinds. Furthermore, when there is more than one part to blank, dies can be changed in a few seconds, because they are all standard drilled by a jig to fit the Danly die sets used as a foundation.

Most duralumin stock comes in 4 x 12-foot sheets, and an important problem is to insure getting the maximum number of parts out of the sheet. To achieve this goal, a routing machine was developed, Fig. 2, which has proved itself ideal for this work. It takes a stack of sheets on the work table to the thickness of nearly ½-inch. Templets are on another table across the center rail which forms the backbone of the machine. On a recent test this machine blanked out of a 10-deep pile of 0.040-inch stock, 10 each of 17 parts, using the full area of the 4 x 12-foot sheets. This was accomplished in 30 minutes at the rate of nearly 6 pieces a minute.

Although this rate is slow compared with the production of a crank press, once the latter has been fully set up, advantages of the method are clear when one estimates the time which would be consumed to make 17 setups on a crank press. Furthermore, the same machine drilled several thousand No. 40 drill holes in these sheets, without an extra setup.

Since putting this machine into operation, many other jobs have been found which it can handle, such as blanking out of odd-shaped holes in a part on two levels as shown in Fig. 4, right. This job, formerly done with fly cutters and drills in 7 hours, now is being completed in 7½ minutes per part.

Other methods include square shearing with several 14-foot shears, circle shearing and rubber blanking. The latter method results in a large scrap wastage because of the margins required for shearing.

Most aircraft manufacturers do a major part of their forming work on large hydraulic presses, over steel form blocks with rubber pads on the ram. This method has one or two unique aspects. It is fast, not requiring any appreciable setup time. When two movable tables are used to feed it, it is faster than a crank press. It is particularly suitable for aircraft production because no scratches or abrasions are formed on the surfaces of the duralumin parts. In the aircraft business an oft-repeated maxim is: "Scratched dural is scrap dural."

Flexible fences around the piece are often used to direct the flow of the rubber pad on the ram against the edge of the part, thus concentrating pressure where it is most needed. Assorted types of holes may be blanked in the parts, sharp edged punches being used simultaneously with the forming operation.

The drop hammer is another popular tool which has some special advantages, chief of which is the ease with which large draw dies may be made out of hard zinc, with lead for punches. Intricate designs may be worked out, utilizing the flexibility of the variable stroke so the part can be formed in easy stages. This is accomplished by using several sheets of plywood, both as spacers and draw rings. A further advantage is the fact that after heat treatment the parts can be restruck, using the weight of the lead punch and the heavy ram plus the long drop of the ram to strike a blow of much greater force than could be had on any crank press. This heavy hammer blow corrects heat treatment deformations and sets the metal by a forging action on all parts of it.

Forming of large sheets which no press or hammer is large enough to take, such as pieces of fuselage skin, is done on one of the oldest machines in use today—the trip or "bump" hammer — in practically the same form as it was used three generations ago.

A machine developed at Bell Aircraft which has found wide ac-

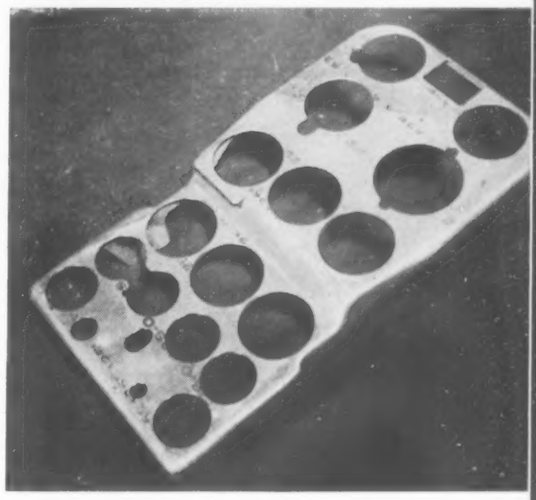
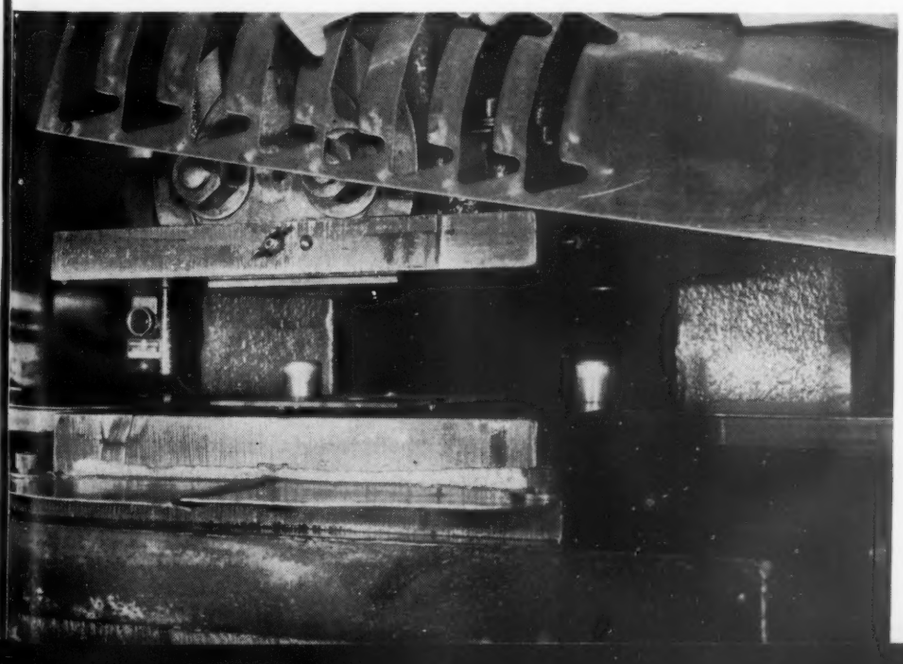


Fig. 4—Instrument panel, completed on routing machine in 7½ minutes, formerly required 7 hours with fly cutters and drills

Fig. 3—Quick-change blanking die of thin steel plate set up in press for blanking operation on aluminum alloy sheet. Note die set for registering upper and lower dies



ceptance in the industry and which is used for forming various curvilinear shapes from sheet metal is a gargantuan copy of the old tinner's rolls, Fig. 1, except for the length of the rolls. Some of these machines have been built with an upper roller 15/16-inch in diameter and 15 feet long, backed up every few inches by needle roller bearings. All controls are electric, and micrometer dials are direct reading, easily noted from a distance.

We in the aircraft industry believe we are progressing in the development of production methods suitable especially for airplane construction. All tooling must be built quickly and at reasonable cost. As far as possible, all tools must be readily changeable. Zinc and lead dies, for example, can be remelted many times, and blanking dies of ⅛-inch boiler plate can be replaced rapidly with others. With respect to routers, the same die sets remain, the only tooling being a flat 1/16-inch steel templet. Here flexibility has been achieved within a matter of hours instead of days, and at small cost.

New Tools Speed Machining of Armor

■ McKenna Metals Co., Latrobe, Pa., announces new Kennametal tipped tools for interrupted cutting of steel castings and forgings in lathes, boring mills, shapers and planers. They are designed to quicken production in machining armor plate, tank parts and other irregular shapes of steel castings and forgings.

Featuring a shear angle of 35 degrees combined with a positive side rake of 15 degrees, the tools are offered in styles 35, 36, 37 and 38, and in opposite hands. Their principle is that interruption on the work first strikes the tool at a place back of the extreme point, where the cutting edge is mechanically strong, and then shears off the chip with a progressive action.

Tips of the tools are longer than other standard tools to compensate for the fore-shortening of the 35-degree angle—they project above the shank at the back to allow sufficient steel under the point.

New Method Speeds Tin Sample Analysis

■ An improved spectrographic method for analyzing tin samples for impurities said to reduce greatly the time required for examinations has been developed by the National Bureau of Standards, according to the Department of Commerce, Washington. It enables six samples to be analyzed in 2 hours compared with 2 days under the older wet chemical method.

By the new method, evolved by Bourdon F. Scribner of the bureau staff, tin is melted or compressed into electrode rods between which a high tension spark is passed, causing vaporization. The spectral lines in the vaporized metal are recorded on a photographic plate. The intensities of the lines of various impurities are measured relative to control lines of the tin spectrum by means of a photocell and galvanometer incorporated in a microphotometer. The relationship between impurity intensity line and concentration is plotted as a curve.

Ten impurities—antimony, arsenic, bismuth, cadmium, copper, indium, iron, lead, silver and zinc are determined by the method. The error is usually about 5 per cent plus or minus of the amount present, but may be halved by close control.

Camouflage Paints Obscure Objectives

■ Camouflage paints for concealing strategic military and civilian objectives were announced recently by the Cleveland headquarters of Sherwin-Williams Co. Colors offered include field drab, earth brown and dark green—according to color standards established by Army experts and approved by the Office of Civilian Defense.

The paints are for spreading over roofs, buildings, streets and other structures. They dry without gloss or reflections and permit streets to be "painted out" or nonexistent streets to be "painted in," and make conspicuous objects merge into natural background. They also adhere to practically any type of surface from glass to asphalt roofing, and may be spread over blacked-out windows, roads, sidewalks, tanks, smokestacks.

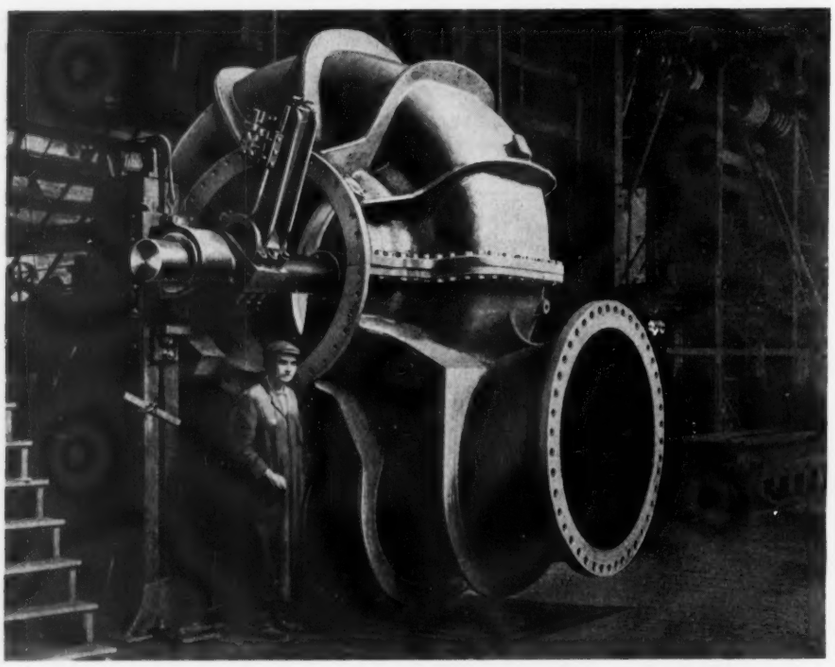
In many cases industrial buildings with the use of these paints can be made to resemble cottages.

Handbook on Castings

■ A complete handbook on Meehanite castings, describing manufacture, metallurgy and engineering properties, has been published by Meehanite Research Institute of America Inc., 311 Ross street, Pittsburgh. It contains 47 pages of facts important to engineers, designers, machinery manufacturers and other users of castings.

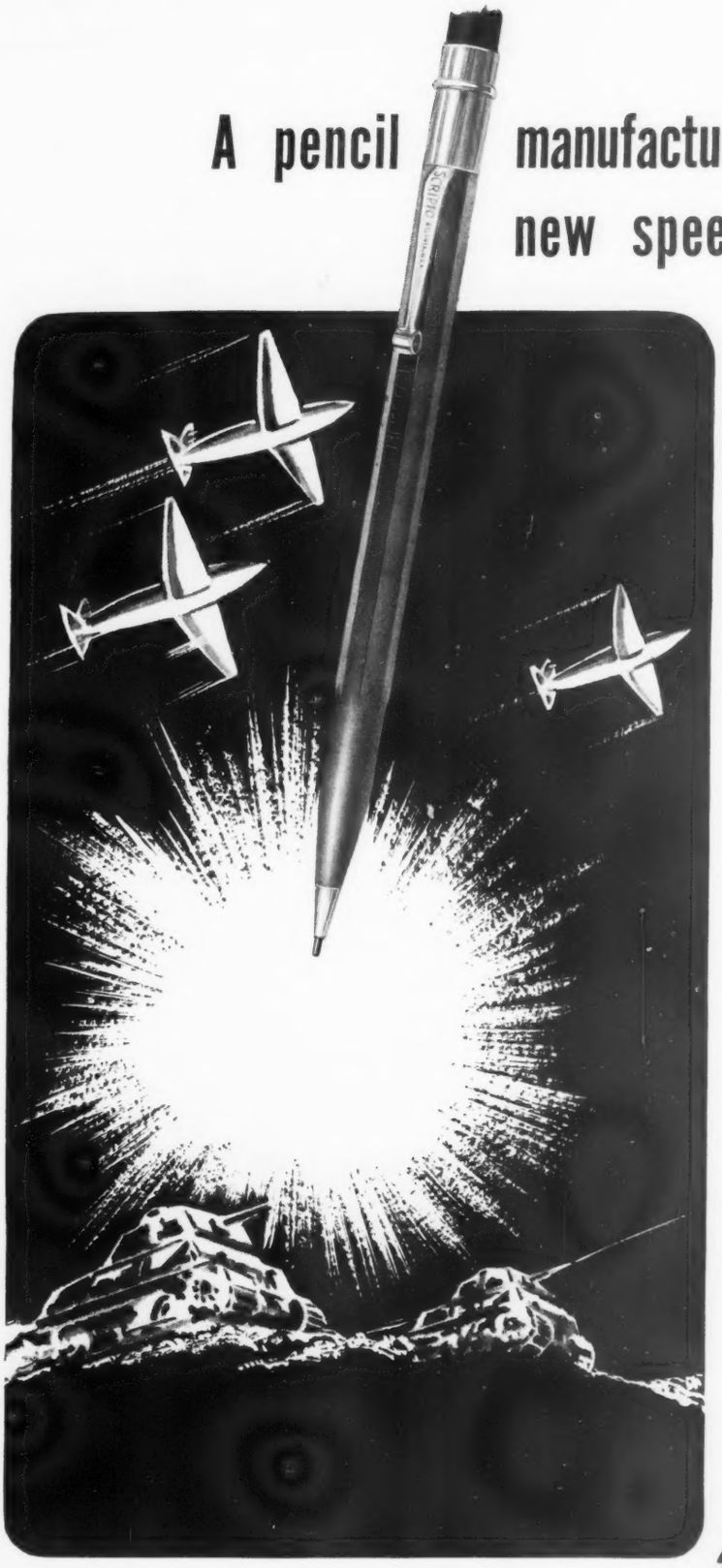
A nominal price of $1 has been placed on the handbook but copies will be sent free to industrialists able to use its data, when application is made on business letterhead, giving title of the applicant.

Huge Pumps for Hawaii



■ **Above is one of four huge 54-inch pumps supplied by Morris Machine Works, Baldwinsville, N. Y., for the United States Navy Drydock at Pearl Harbor, Hawaii. It has a capacity of 130,000 gallons per minute against a total dynamic head of 20 feet. Of the vertical shaft type, the four pumps are set in the dock well under ground. They operate at 277 revolutions per minute. Each is driven by a 1250-horsepower motor**

A pencil manufacturer showed the experts new speed in shell production



. . . *after Scripto and Revere worked together*

An output of 13 to 15 millior automatic pencils a year is real production for any plant. This is the volume the Scripto Manufacturing Company has been producing.

But making brass boosters for high explosive shells is a very different problem. At least, that's what the experts thought when Scripto went to work for Uncle Sam. But production genius has a way of getting results . . . and today the Scripto plant is turning out millions of boosters at a high production rate.

If this were an isolated instance, or just luck, it couldn't mean much to you. But behind it is a story of skillful planning, in which a Revere Technical Advisor was able to supply the needed answers about brass. New tools were made, new machinery built, new gages designed, and new methods were worked out.

The first booster told the story. The set-up was right, and the brass from Revere was right . . . boosters started pouring out with almost the volume of the former "Scripto" pencils.

This is an example of the way Revere Technical Advisors have been able to help scores of Revere customers, old and new. If you are up against some problems in changing over, why not call Revere? It's the surest way to be *sure* in working with copper alloys and brass.

REVERE

COPPER AND BRASS INCORPORATED

Executive Offices: 230 Park Avenue, New York

Sales Offices and Distributors in most of America's major cities

Mills: **BALTIMORE, MD. • NEW BEDFORD, MASS. • ROME, N. Y. • DETROIT, MICH. • CHICAGO, ILL.**

Fig. 1—Here an inspector checks feed of cartridge belt from ammunition box by inserting cartridges and withdrawing them. Note how top of box is secured by double hinge and through pins

AMMUNITION CASES For FIGHTER AIRCRAFT

. . . . as made by Curtiss-Wright at its Buffalo Kenmore plant for use in the famous Curtiss pursuit planes

By GEORGE SMITH
Maintenance Supervisor of Spot Welding
Curtiss-Wright Corp.
Buffalo

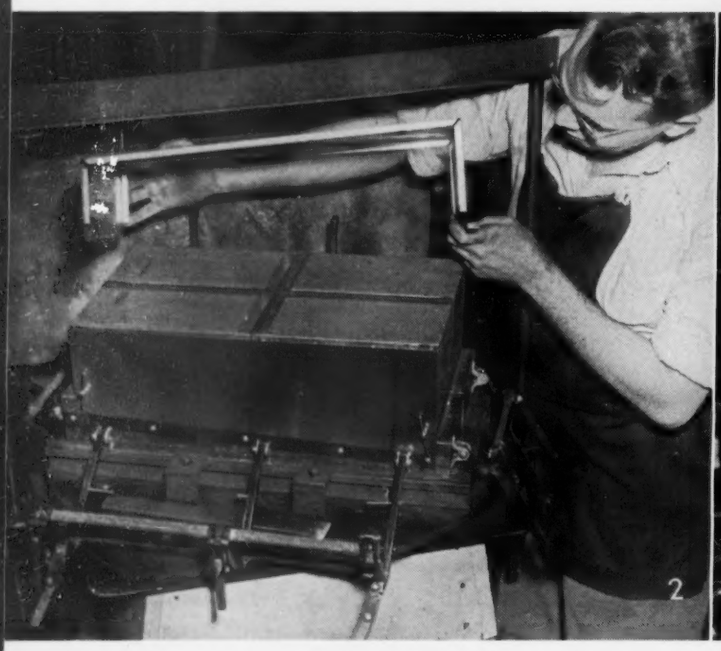
■ FIGHTER craft such as the Curtiss P-40 series (including the British Tomahawk) have numerous machine guns mounted not only in the fuselage but in the leading edges of the wings. Boxes holding the ammunition to feed these guns vary in shape and dimensions according to the caliber of the gun, place in the plane, amount of ammunition carried, and other factors.

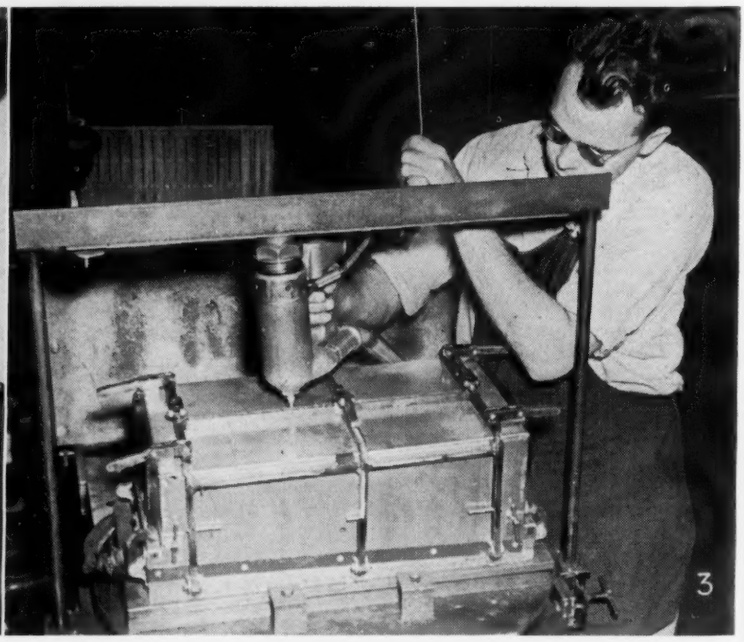
Essential requirements of such ammunition boxes include perfect interchangeability, high strength to resist deformation which might make the ammunition jam, high resistance to corrosion and minimum amount of space consumed by the box structure itself. Too, the weight of the box must be as low as possible consistent with the required strength. Many ammunition boxes such as those shown and described here are made of 18-8 stainless steel. Practically all of this material is fabricated from half-hard stock.

Fig. 1 shows a group of typical ammunition boxes, each 18 inches long, 8 inches high, 3½ inches wide. They are made from 0.02-inch stainless steel with hinges of 0.03-inch stock and all designed for holding 500 rounds of .30-caliber cartridges. The continuous hinges run full length along both edges of the top. Pulling the hinge pin on one edge permits the top to be opened for reloading the case, yet when top is shut and pin reinserted, no amount of vibration can possibly loosen the cover. A feed mechanism is mounted in one end of the box. It is this that the inspector is examining closely in Fig. 1 by observing the action as he draws linked cartridges through it. The cartridges are assembled into a continuous belt by a series of clips formed like hinges with the cartridges as the hinge pins. As the gun pulls the cartridge from the web to feed it into the barrel, the web automatically disintegrates just as a hinge falls apart when pin is pulled.

After the stainless steel parts have been blanked and formed, the assembly is first tack welded in a jig of the type shown in Fig. 2. The particular fixture in Fig. 2 provides for three partitions which divide the inside of the ammunition box into four sections. One of these partitions extends lengthwise throughout the middle of the box, a second and third crosswise on either side of this first. In the illustration, these three pieces have been inserted into the jig and their flanges are lying on top. The operator is seen placing the top sec-

Fig. 2—Assembling parts of ammunition box into special fixture for tacking
Fig. 3—Tack welding is spot welding, an air-operated welding gun being employed against a backing up bar to exert pressure on the joint as shown

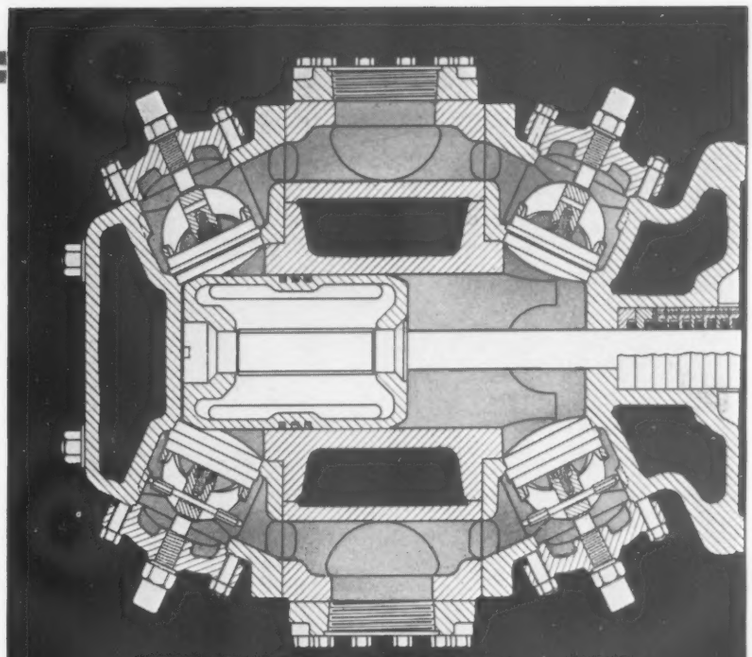




Any Gas Any Pressure Any Service

Day after day, year in and year out, thousands of Cooper-Bessemer compressors continue on the job — efficiently, economically, dependably. In fact, the first compressor ever built by this company, put into service in 1909, is still doing regular duty after 33 years.

Do you use compressors? If so, write us. You, too, may find the solution to your problems in a slow-speed heavy-duty horizontal with motor drive, as did Owens-Corning. Or, an angle-type engine-driven unit may better serve your needs. Bulletins are available upon request and our sales offices are ready to serve you.



CROSS SECTION OF COMPRESSOR CYLINDER SHOWING GAS CIRCULATION WATER CIRCULATION

In the cross section above may be readily seen such important features as the removable cylinder liner, the valve lifting arrangement, the flow of gas in compression and the water cooling system.

FOR ELECTRIC POWER

The slow-speed heavy-duty horizontal compressor, its dependability proved by years of experience in gas-engine units, is now available in motor-driven units. Models with motor drive include single and twin cylinder, tandem units, of from 500 to 3,000 hp.

Compressor cylinders are designed to produce and maintain up to 6,000 lb. working pressures. Removable cylinder liners permit the use of corrosion-resistant metals for unusual gases. Other distinctive features include a unique valve lifting arrangement, exact control devices, positive lubrication, and quick accessibility of all working parts.

THE COOPER-BESSEMER CORPORATION, MOUNT VERNON, OHIO

The Owens-Corning Glass Company recently installed this Cooper-Bessemer motor-driven horizontal compressor at its Newark, Ohio plant.

Cooper-Bessemer

ENGINE BUILDERS SINCE 1833

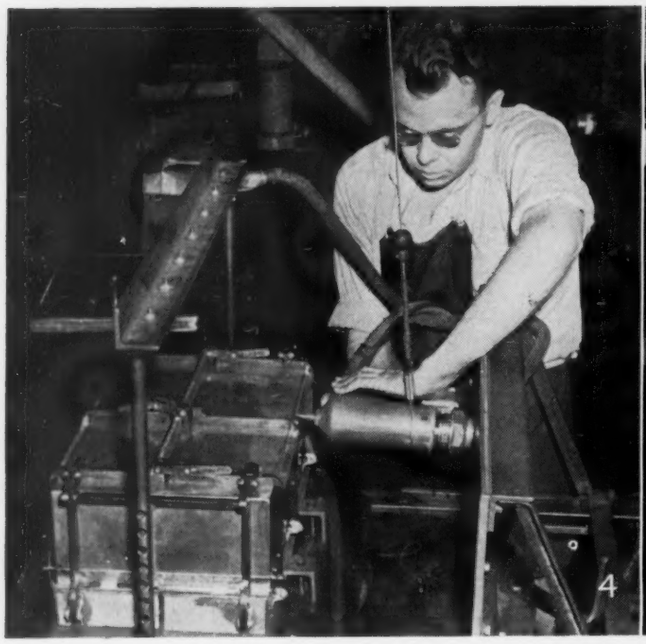


Fig. 4—Preliminary spot welds or tacks are made on ends and sides with the gun backed against this plate. Gun exerts pressure by expansion of air cylinder, trigger on gun actuating both welding current and air supply controls

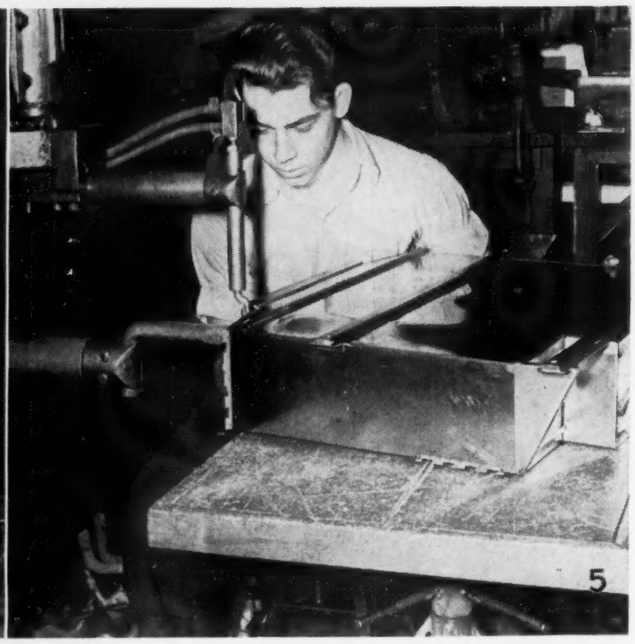


Fig. 5—Welds through thin sections of case are completed on this type of spot welding machine at a fast rate as operator moves work along under welding tips

tion of the box on the jig. Note this top piece is folded to form the ends of the box also. The bottom of the box is a separate piece. The top of the box will be attached later by means of the continuous hinges.

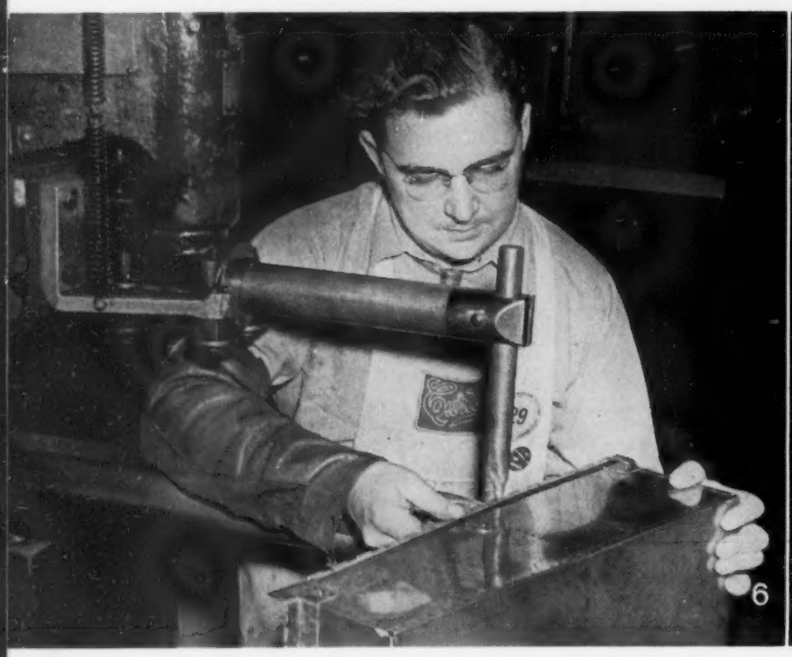
As the operator completes assembling the parts onto the jig, the quick-acting clamps, which are hinged to fall away at the sides, are locked in place at top as shown in Fig. 3. The use of the jig satisfies the first requirement of this work—that all ammunition boxes be built to exact dimensions desired, perfectly square, uniform and interchangeable.

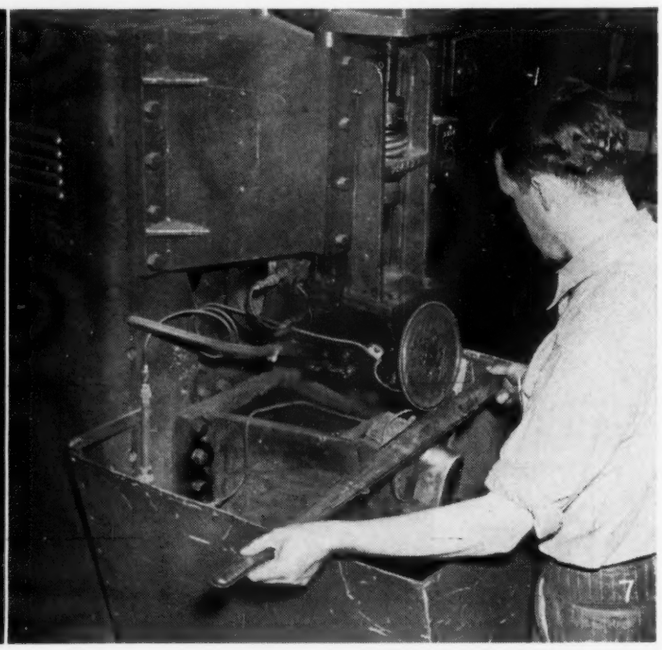
Now the operator tacks the parts together by spot welding at intervals along each of the seams. An air-operated expansion gun enables a sufficiently high force to be exerted between the welding tip and the work. This force is obtained from the expanding piston which presses against the steel reinforced copper back-up plate in Fig. 3. The operator does not have to support the weight of the gun since it is counterbalanced by means of a flexible wire cable shown in Figs. 3 and 4, which extends up over a pulley with a weight of appropriate size on the opposite end.

Controls connected to the welding

Fig. 6—Heavier sections such as through hinges are welded on a heavier machine like the one shown here. Automatic timers repeat welding cycle as long as operator holds down foot switch on these setups, making for high production speeds

Fig. 7—Seam welder applies 8000-ampere shots of welding current to seam weld radio antenna mast





Blazing New Trails FOR PEACE and PLENTY

At the southern tip of Texas is soil said by some to be the richest in America. Today thousands of acres are producing fine garden truck -- beans, onions, carrots, beets, potatoes. Other thousands are in citrus orchards, with an annual crop already of more than 11 million boxes.

Prior to the coming of modern steel in this section--the first standard gauge railroad in 1904--this valley was desolate, thorny jungle, incapable of sustaining human life. And only since the advent of modern machinery is there real progress in making it productive for man. Now for example, with this machine, built largely of Youngstown steel, mesquite, ebony and brush are being cleared off at the speed of one acre an hour -- 24 hours a day!

For many years, heavy equipment companies have found Youngstown steels ideally suited for making their products. For the peacetime needs of America's future, as well as for defense of the present, Youngstown is always ready to serve.

25-29D

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gun are such that as the operator pulls the trigger, air pressure is applied first to hold the gun securely against the work, and then the welding current is applied automatically for the correct cycle.

For two thicknesses of 0.02 or one thickness of 0.02 and one of 0.03-inch stainless, a welding current of about 4000 amperes is applied for six cycles, power being obtained from a 60-cycle source. The length of time the welding current is applied is determined automatically by a precision electronic timer.

The welding current flows from a welding transformer into the copper back-up plate. It is then transmitted from the piston of the expansion guns to the welding tip, flows through the joint to be welded and returns through a circuit consisting of the copper strips built into the fixture and a cable from the fixture to the transformer.

After the operator completes the tack welds on the top of the fixture, the fixture and work are revolved on the rotating table and clamped in position as shown in Fig. 4. Now the operator tacks the sides, using the stationary backup plate shown at the right of the gun in Fig. 4. As soon as the tack welds have been made along this side, the fixture is revolved and both ends similarly tacked in place.

Upon removal from the tack welding fixture, the work goes to the stationary spot welders for completion.

Fig. 5 shows an ammunition case being completed after tack welding has been done in the jigs. The work is placed on a revolving table which is adjustable for height to bring the case into a position most convenient to handle. Fig. 5 shows an operator making these welds at a rate of about 90 spots a minute. Tips are 5/16 to ⅜ inch in diameter, and the spot welds are spaced about ⅜-inch apart by hand. Some 5000 amperes are applied for a 3-cycle timing period at each weld. The timing is handled automatically by vacuum tube timer.

The operator controls the welding by means of a foot switch. As long as this foot switch is held down, the tip pressure is applied to close the tips and the welding current comes on for the required period automatically; at end of welding period, tip pressure is released automatically and cycle repeats after a brief interval for moving to the next spot. This automatic repeat is an important factor in permitting the high production obtained in this work.

The operator holds down the foot pedal and moves the work along from spot to spot during the intervals between application of pressure by the electrodes, thus attaining minimum lost time in moving from spot to spot.

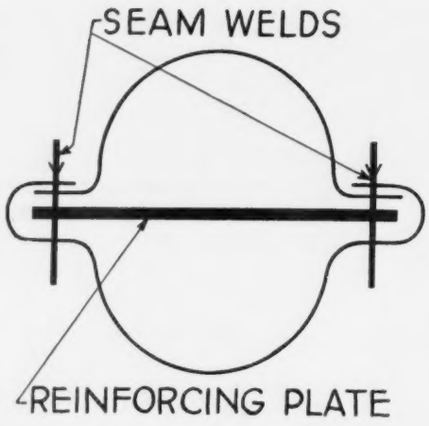

Fig. 8—Cross section through chromium-molybdenum steel sheet and flat reinforcing plate that make up antenna mast

Fig. 6 shows a similar operation but using a larger machine for the heavier work. Here the continuous hinge is being welded to the edge of the ammunition case after having been tacked in place in a fixture. This continuous hinge consists of 0.03-inch stainless with a hinge element every ½-inch along its length. The welding current must pass through two thicknesses of this material as well as a thickness of the 0.02-inch material. At the same time, considerable pressure must be applied to close the two halves of the hinge around the body section between them. The machine shown provides a squeeze pressure of 475 pounds at the welding tips. These Elkonite tips, incidentally, are cleaned after about every 30 spots.

The welding department in addition to six tack welding stations using welding guns includes 14 automatic spot welders, one seam welder and 4 spot welders of the type actuated by a foot pedal.

Typical of the work done by the seam welder is the fabrication of radio masts from chromium-molybdenum steel sheets. The mast shown in Fig. 7 has an oval cross section about 2 inches wide at the base and about 1½ inches wide at the top, through the largest dimension. Thickness tapers from about ¾-inch at the base to about ⅜-inch at the top. Mast is about 3 feet long and is made of 0.03-inch sheet formed as shown in Fig. 8 and with a flat reinforcing plate welded between the two halves near the base to provide added strength at this highly stressed section. The cross section, Fig. 8, shows where the seam welds are made along the flat portion on either side of the hollow section, also the reinforcing plate.

In welding this job, the seam welder applies a series of overlapping spot welds to form a continuous seam, which is about 3/16-inch wide. The welds overlap each other about ⅛-inch. The automatic tube timer is synchronized with the drive which revolves the wheel electrodes so that only 18 seconds are required to complete the seam along one side of the mast. Current applied is about 8000 amperes. The wheel electrodes are arranged to exert a pressure of 600 pounds at the seam.

Publishes Book for Welding Instructors

■ International Acetylene Association, 30 East Forty-second street, New York, announces a new book prepared primarily to assist instructors in planning courses for training oxyacetylene welding and cutting operators.

Entitled "Training Oxy-Acetylene Welding and Cutting Operators—Instructors Outlines," the publication is divided into three chapters. The first outlines essential information to be presented in training a general welding operator, an aircraft welding operator and a pipe-welding operator. The second suggests material essential to the training of various types of cutting operators, and the third outlines information for training inspectors.

The introduction of this 88-page book describes in detail the organization of the book and gives suggestions for its use. Also recommendations for qualitative testing of the work done are included. Copies are available from the organization's headquarters. Those paper bound are priced at 25 cents each, and the cloth-bound copies are 75 cents each.

Capacitors Overcome Power Difficulties

■ Installation of capacitors recently by R. D. Cole Mfg. Co., Newman, Ga., brought about power factor averages of over 90 per cent and a substantial reduction in power costs. Before, according to the company, the power factor of the plant had a value approximately 50 per cent. This was due to variation in the load brought on by electric welding and to magnetizing current far in excess of the working current. See STEEL, p. 62, Jan. 26, 1942.

The capacitors, which have ratings of 60, 30 and 15 kilovolt amperes, were installed on the company's large motor terminals and at load centers on the power feeders. Units used at the load centers were connected to enclosed fusible knife switches, while capacitors on large motor terminals operate only when the motors are running. Units installed are of the Pyranol type supplied by General Electric.

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ATKINS
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On the Toughest Going
THE SAW
Atkins Segmental Cold Saw (66-inch diameter) with replaceable segments of Atkins "Curled-Chip" Teeth.
THE JOB
Sawing 18" x 18" aluminum ingots at the rate of 3 minutes per cut—108 square inches per minute.
★ ★ ★
PUTTING TEETH INTO ARMAMENT PRODUCTION

● One way in which Atkins Saws are helping lick the toughest cutting jobs in armament production is illustrated here. The Segmental Cold Saw shown was reported as still sharp and ready for more cutting after making 325 *consecutive cuts through 18" x 18" aluminum ingots*—a total of 74,300 sq. in. of cutting without dulling the saw!

Chief of the reasons for this unprecedented performance is the new Atkins Curled-Chip Tooth. By removing metal in clockspring-like chips on the order of a lathe cutting tool, and possessing an extra large curved gullet, this new tooth form vastly increases cutting capacity and greatly extends the cutting period between re-grindings.

In addition to the Segmental Cold Saw shown here, the new Atkins Curled-Chip Teeth have been adapted to power hacksaw blades, circular milling saws and bandsaw blades. Performance data on each are available on request.

E. C. ATKINS AND COMPANY

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SWITCHGEAR

For Modernizing Hot Strip Mills

Replacement of portions of old-type switchgear with modern equipment proves to be economical. Additional circuits supply enlarged mill in about same space as abandoned units. Improvements in switchgear are in field of protective relaying thus minimizing damage to electrical machinery. Safety to operators is built into factory-assembled equipment

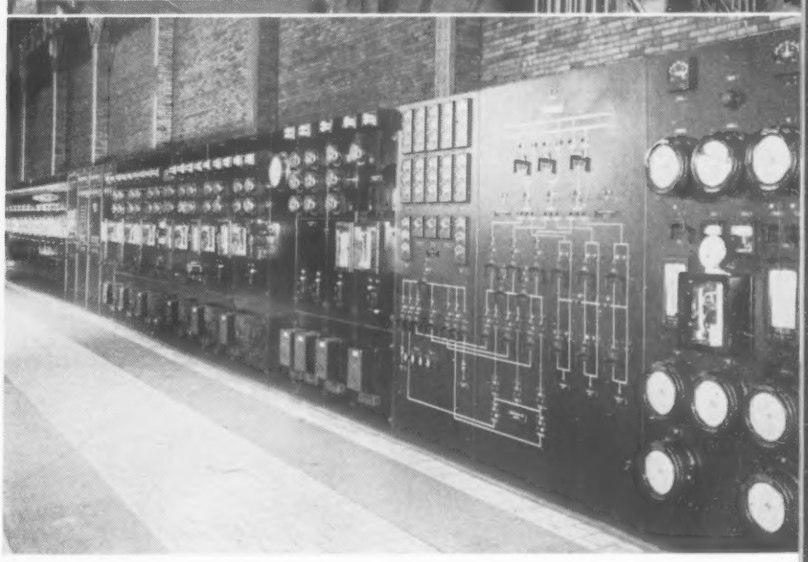

Fig. 1—(Upper view)—600-volt, direct-current, heavy-duty air circuit breaker switchboard and bus structure controlling generators and motors of a main hot strip mill drive

Fig. 2—(Lower view)—Modern semi-flush steel duplex switchboard sections replace vital portions of an old-style open-type switchboard to control the circuits containing the breakers shown in Figs. 1 and 5

By W. N. GITTINGS
Switchgear Division
General Electric Co.
Philadelphia

■ STEEL MILL switchgear has "become of age" during the last decade. It has developed in that time into a thoroughly co-ordinated equipment, carefully engineered and manufactured and completely assembled at the factory. This development has made it possible to fit modern switchgear into modernization programs for older hot strip mills in a way that would have been impossible ten years ago. In fact many of the more recent modernization programs would have been impractical but for the availability of this modern class of switchgear with features fitted expressly to just this sort of program.

Several problems associated with switchgear must be given consideration in any mill modernization program, the most important usually being that of increased power requirements. Modernization programs for older mills usually involve a considerable increase in the tonnage capacity of the mill. This results in a proportionate increase in power requirements necessitating the addition of generating or transformer capacity to the system. The immediate result of such additions is to increase the magnitude of possible short circuit currents. The elements of the original switchgear, often having been selected to withstand only the lesser short circuits of the original system, frequently are found to be entirely inadequate for the heavier duty which would be imposed upon them.

Such expedients as the sectionalized system or the introduction of current limiting reactors into the main arteries of the system to overcome this difficulty usually are found to be costly and in many cases impractical.

A total replacement of the vital portions of the old inadequate switchgear with modern switchgear designed to meet the increased short circuit requirements usually turns out to be both the most economical and most practical solution.

Another important and often perplexing problem is that of the space required for extensions of the switchgear to take care of added circuits and increased capacities. Generally speaking, modern factory-assembled gear require much less space per circuit than the old switchgear. Experience has proved that it is usually possible to install new gear of adequate capacity, and with sufficient additional circuits to supply the enlarged mill, in about the same space as that occupied by the old gear. This is a decided advantage where, as is usually the case, space is at a premium.

The cost and especially the time of installation of any item entering into a modernization program must be considered carefully since, as a rule, the mill must be kept in production during changeover operations. Older types of switchgear are almost without exception of the "field assembled" variety. On that account extensions and modifications of such gear involve large expenditures for installation labor and extensive shutdowns of the mill to permit the carrying out of such "field assembly" operations with reasonable safety to workmen. Modern factory-assembled switchgear, on the other hand, makes possible a rapid changeover from the old to the new. With careful planning and close cooperation with switchgear designers it is not uncommon for a total replacement of major portions of an old installation to be made during a week-end shutdown of the mill. Such rapid changeover operations are made possible in a large degree by careful grouping of the units of the new gear in such a way as to

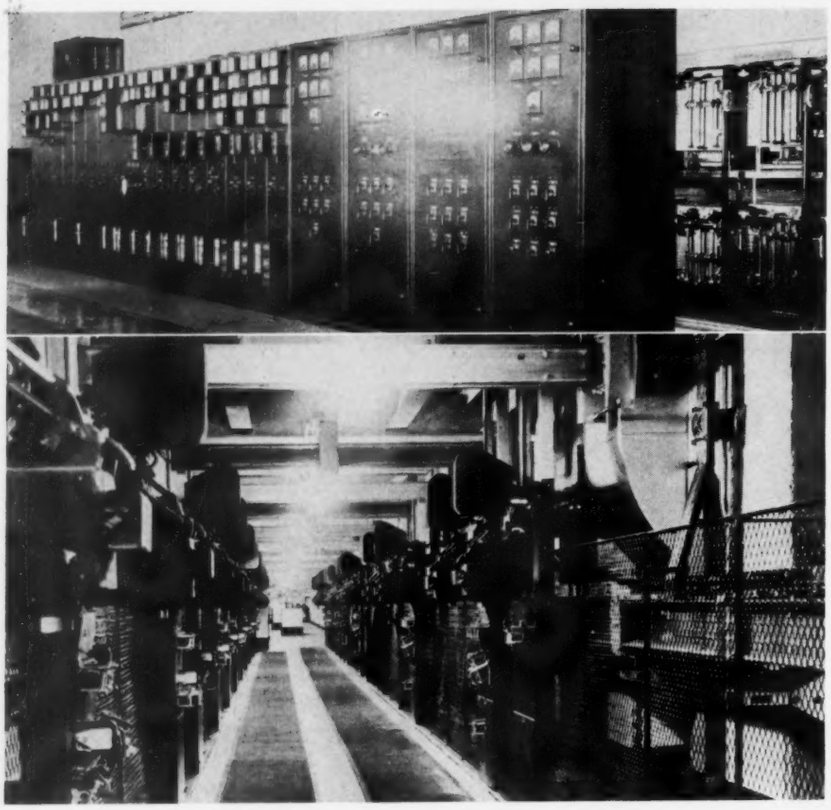

Fig. 3—Modern duplex switchboard controlling circuits containing the breakers, shown in Fig. 4, and replacing a portion of an old-style open-type switchboard

Fig. 4—Arrangement of 600-volt heavy-duty circuit breakers for motors and generators of a main drive

permit progressive replacement of a few circuits at a time, thus minimizing interference with the power supply to the mill.

One of the most important improvements in switchgear in recent years has been in the field of protective relaying. With the ever-increasing complexity and capacity of power distribution circuits resulting from more complex and larger capacity mills, the problem of quickly and effectively isolating faulty apparatus from the remainder of the power system has been given a great deal of study by switchgear builders. As a result, modern switchgear accomplishes this result with such certainty and dispatch that interruptions of operation by reason of failure of electrical apparatus in thoroughly modernized mills have almost reached the vanishing point.

A further important result of this improvement in protective relaying has been the minimizing of damage to electrical machinery and transmission facilities when trouble does develop. High-speed differential relaying for generators, transformers, motors, buses, and transmission lines, combined with higher opening speeds on circuit breakers, have made it possible to isolate faulty apparatus before serious damage is done without unduly disturbing operation of the remainder of the system.

Simplicity, sturdiness, and easy maintenance have long since become watchwords with the designers of steel mill switchgear. Relaying and control circuits have been simplified without the sacrifice of reliability and effectiveness. Devices have been made strong and reliable. And the overall design of assembled equipments has been based on a maximum of accessibility and operating convenience. As a result, modern equipment requires little maintenance and such routine maintenance operations as are necessary have been greatly facilitated by the use of removable, interchangeable circuit breakers, and relays. This makes it possible to carry on maintenance operations under the most favorable conditions and without interference with normal operation of the mill.

The control of the many and diverse items of electrical equipment entering into the operation of a hot strip mill places a considerable burden upon the operators of the mill unless these controls are coordinated carefully as to type and location. Switchgear controlling

Fig. 5—Modern 6900-volt metal-clad switchgear at right partly replaces and supplements old truck-type switchgear in modernized hot strip mill motor room

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this equipment is designed with a view to making routine mill operation as simple and convenient as possible. For example the starting of machines such as motor-generator sets, pumps, compressors, and ventilating equipment is made entirely automatic in response to single control switches located on compact, centrally located switchboards. Complete annunciator systems are provided to warn operators of the occurrence and exact location of abnormal conditions such as overloaded machines, hot bearings and inadequate ventilation. Control of the mill drives is centered in operators' pulpit bench boards designed to give operators complete and convenient control of the mill from a single location. Adequate signal facilities are provided to keep the mill operators informed as to the generating capacity available for driving the mill. Indicating meters showing mill speeds and loads are also provided.

Special attention also is given to providing adequate recording and demand metering equipment so that comprehensive studies can be made conveniently to determine power requirements of various rolling schedules. Regulating equipment is provided to control the power factor or reactive kilovolt amperes of large synchronous motors. This permits operation of the mill under power factor or reactive kilovolt-ampere conditions which will result in minimum power charges where penalties are imposed by the power company for poor power factor or excessive demands for reactive kilovolt amperes.

Maximum safety to operating personnel is another feature built into modern steel mill switchgear. The days of dangerous, exposed live parts are gone. The possibility of accidental contact with live conductors is reduced to a minimum by the use of totally metal-enclosed switchgear and bus ducts. The open-type switch has been eliminated almost universally from high-voltage circuits by the use of removable circuit breakers with motor-driven elevating mechanisms. All operating switchboards are made strictly dead front, and in general, all live parts, even on the so-called "safe" low voltages, are either enclosed or located in such manner as to prevent accidental contact. Safety interlocks of substantial design are provided to prevent injury to apparatus or personnel resulting from incorrect switching operations.

Converts Single-Spindle Automatics

■ TIMKEN Roller Bearing Co., Canton, O., was recently confronted with the problem of speeding up production of bearings 3¼ to 10 inches outside diameter for tanks and trucks. The machines capable of handling these sizes were working at full capacity while at the same time drastic curtailment of passenger car production had thrown 40 of the smaller automatic machines out of production. These had a maximum size capacity of 3¼ inches outside diameter.

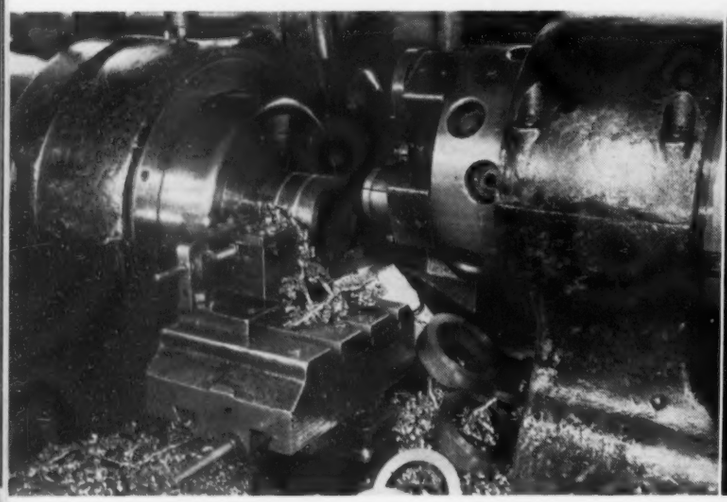
The obvious solution to this problem, under normal conditions, would be the purchase of new machine tools. However, since new tools were not available, the only other solution was to retool the smaller machines to accommodate sizes up to 8 inches in diameter. Timken engineers discovered that the 40 single-spindle machines could be made to do all the forming operations, but they were incapable of handling the cut-off of the larger tubes. So 20 heavy-duty single-spindle automatics which had been producing completed parts were set aside to make slugs for the smaller machines.

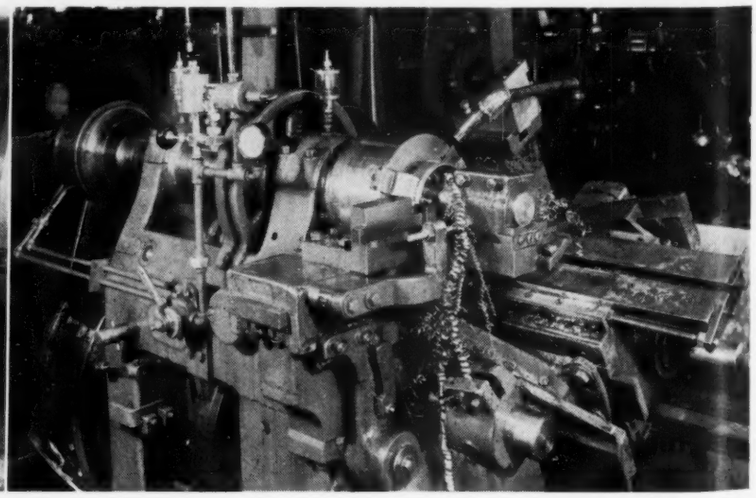
The conversion involved the removal of the old feeding and chucking mechanisms. The spindles then were equipped with 3-jaw adjustable air-operated chucks as in center, Fig. 2, right, below. A taper attachment (shown in the foreground of Fig. 2) was constructed so as to turn either the tapered outside diameter or bore the inside diameter. All bearings were replaced and the machines then were given a thorough overhauling.

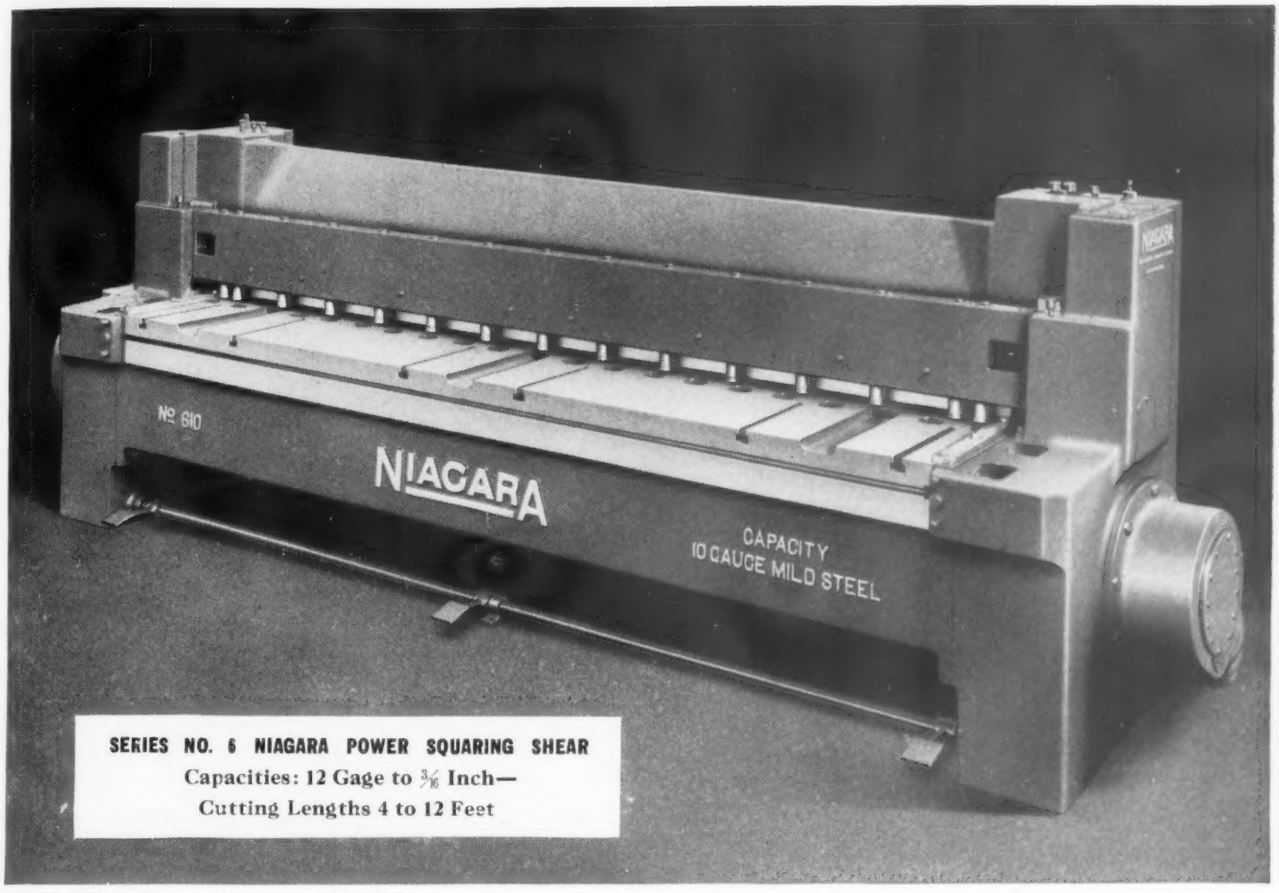
Production proceeds through three steps: One, slugs are cut on the larger machines. Two, outside diameter is turned on a converted air chucking machine. Three, inside diameter is bored on a second converted air chucking machine. Despite the fact that the three operations are performed on three separate machines, the 40 converted air chucking machines plus the 20 heavy-duty automatics involved in these three operations put out as many finished pieces as 80 heavy-duty automatics are capable of producing in a given time.

The first consideration in this conversion program was to meet the increased demand for more of the larger product at any cost. Second in importance was the utilization of unadapted equipment.

The third consideration was cost. Naturally, the parceling out of operations among three different machines entails a cost increase, but this increase is surprisingly small.







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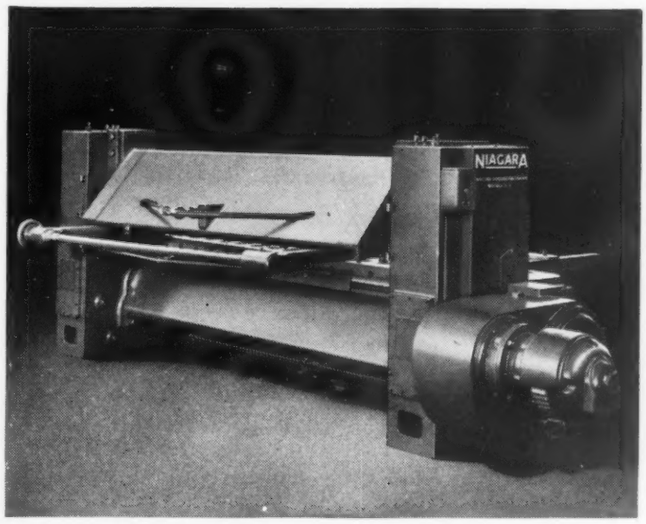
Capacities: 12 Gage to 3/16 Inch—
Cutting Lengths 4 to 12 Feet

DEFENSE PLANTS ARE SPEEDING UP PRODUCTION WITH THESE NEW NIAGARA POWER SHEARS



The rear of these New Series Niagara Shears, illustrated above, is open and accessible for picking up off-cut material. The sloping back of the bed acts as a chute for directing off-cut material to the rear. All rotating shafts, gearing, eccentrics and connections are enclosed.

America's leading Defense Plants including manufacturers of warplanes, tanks and many other types of Ordnance Equipment are increasing output with these New Niagara Shears. High production squaring and trimming are assured by the instant-acting sleeve clutch, quick release of hold-down and convenient operation. They operate at speeds of 85 strokes per minute on light capacity to 60 strokes per minute on the heavier capacity shears.

These New Niagara Shears cut sheared edges and narrow strips straight to within a very few thousandths of an inch.

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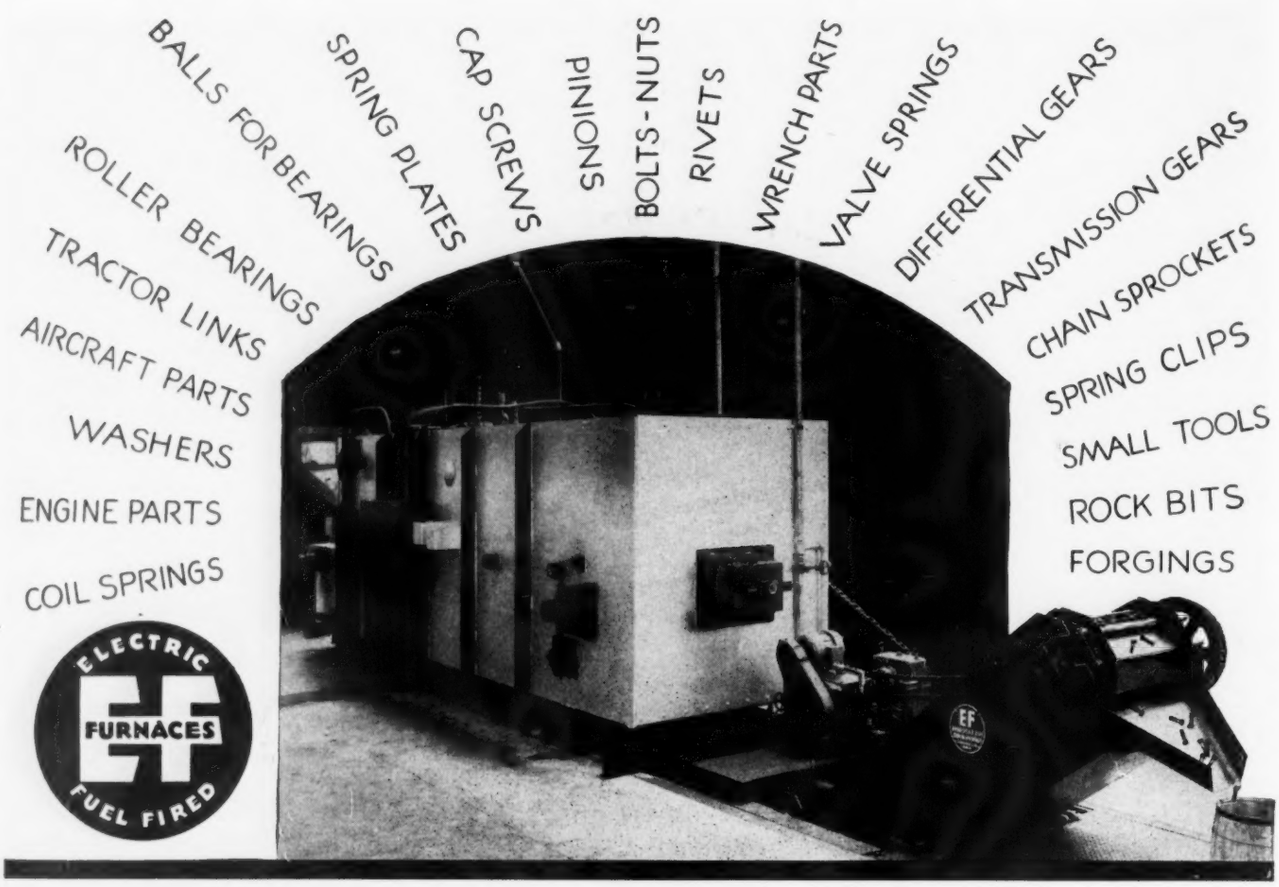

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E. F. Continuous Chain Belt Conveyor Type Furnaces are handling all kinds of products, ranging in sizes from small springs and machine gun cartridge clips up to large crawler links for tanks and tractors. Hundreds of these furnaces are in operation, handling such products as listed above.

The material is loaded directly onto rugged heat resisting cast link belt conveyors. Without further attention, it is carried through the furnace, uniformly heated to the proper temperature and automatically discharged through a sealed chute to the quenching medium or directly from the furnace as desired. The chain belt conveyor returns within the furnace without cooling — no pans or trays are used in the furnace — 100% net material.

These furnaces are built for oil, gas or electric heat in five standard sizes with capacities ranging from 300 to 1700 lbs. per hour. Larger or smaller sizes can also be furnished. They are also designed for using special protective atmospheres for scale-free heat treating and hardening without decarburization.

The hundreds of installations in operation, handling all kinds of material, have proven them the most satisfactory and dependable general purpose heat treating machines built for the uniform, economical, production heat treatment of miscellaneous small and medium sized parts and products.

We will be glad to give you complete information, including installation and operating costs and submit heat treated samples, if interested.

The Chain Belt Conveyor Furnace is only one of the numerous types we build for various heat treating purposes. We build Gas Fired, Oil Fired and Electric Furnaces — Furnaces for any process, product or production. We solicit your inquiries.

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The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

IMPROVED PACKAGING

Speeds Handling and Shipping of Radiators

■ SIMPLY by improving the design of their shipping package and adopting modern handling equipment, the McCord Mfg. Co. has been able to obtain faster shipment of McCord radiators from its plant at Plymouth, Ind., to the Nash Motors plant at Kenosha, Wis. It has been possible to cut handling costs radically. Also of growing importance at the present time is that package material is conserved by the improved design.

At the left in Fig. 1 is shown the old fold-up style, one-trip carton, containing two radiators. This unit had to be handled manually from wrapping department through to storage dock, loading into freight car, unloading, placing into stock at the receiving end and feeding into the production line there.

Contrast this procedure with that made possible by the new Tray-Pak designed by the Gaylord Container Corp., Williams and Arndt streets, St. Louis. This package holds 32 radiators arranged in four tiers of eight radiators each and is shown at the right in Fig. 1. Around the edge of the pallet deck is nailed a ¾ x 1¼-inch strip to retain the corrugated board sleeve in which corrugated board dividers produce four cells.

Each of these four cells contains two radiators, separated in turn by a corrugated paper packing. When this tier is packed, the lid of 0.150-inch solid fiber is applied. It has wood rims on both top and bottom to retain the sleeve under it as well as the sleeve that forms the second section of the package. Thus the package is built up until the top is applied. Wood strips also act as bearing for the ⅝-inch steel strapping that makes the package a rigid shift-proof unit for shipping, the whole assembly being steel strapped to a double faced pallet.

Note that in this arrangement the bottom radiator in each cell supports only the radiator above it. The top radiator in each cell has no load on it at all.

Fig. 2 shows the unit load being stored in a box car at the McCord plant. A fork-type Clark industrial truck powered by a gas engine is used. This unit is capable of delivering 24-hour continuous service, an important feature as production is speeded up to 3-shift operation. By means of the fork truck, the unit package containing 32 radiators is loaded and unloaded as a unit. This greatly simplifies the handling operations, cuts down the number of individual handlings as well as speeding the operations by making it possible to utilize power trucks effectively.

Damage Claims Rare

Radiators so packed and handled travel to Kenosha safely. Damage claims are rare. Where formerly from 60 to 75 radiators per week were damaged in handling, none are damaged now. Important also was the fact that these former injuries often were not revealed until after the radiator had been installed in a car, with consequent loss of time and money in replacing the unit. While the present method of packing and handling has eliminated practically all such instances, it is still possible, of course, for careless handling to result in injury to the radiators.

Upon arrival at the Nash plant, the unit packages of 32 radiators are unloaded readily with a fork truck from the freight cars to the storage areas. At Kenosha, the packages are handled into temporary storage or are placed alongside the assembly line for immediate use. As packages are emptied, the sleeves are collapsed. Then the sleeves, fiber lids and tops, as well as the wood pallets, are bailed into compact loads for return to McCord at Plymouth. This type of package is capable of making 8 to 12 round trips before the corrugated board and fiber parts have to be replaced.

This results in a tremendous saving of the high-grade corrugated board which is becoming increasingly scarce. Thus conservation of important materials is a valuable

Fig. 1—The old package at left and the new unit package of 32 radiators shown here at right. Illustrations from "Improvement", 113 North Green street, Chicago

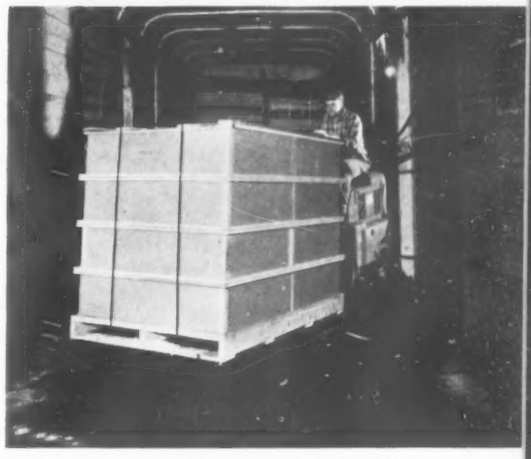


Fig. 2—A gasoline-powered fork lift truck loads the unit packages into the freight car at the vendor's plant in minimum time and at low cost

Fig. 3—Swift unloading and storage at recipient's plant also is done with fork type lift trucks. Tiering two and three high utilizes storage areas with maximum efficiency

point in favor of packaging and handling by this method.

The use of the same type of gas-powered fork truck by both vendor and manufacturer simplifies the handling problem since the pallet and package can be designed for most efficient handling at each end of the line. In each case, movement of the work is done by power equipment that can work 24 hours a day without interruption, that picks up, tilts, carries and tiers the loads swiftly at minimum cost. The ability to tier two or three levels high also is important in assuring that warehouse space will be utilized to maximum efficiency.

The ability to load and unload the freight car quickly by handling in these large packages of 32 radiators each also is a timely advantage at the present since it partly offsets the effect of freight car shortage by more rapid loading and unloading of the existing cars, thus making it possible for them to spend more time actually in movement carrying freight.

American Public Road Policies Are Analyzed

■ *American Highway Policy*, by Charles L. Dearing; cloth, 286 pages, 5¼ x 8 inches; published by the Brookings Institute, Washington, for $3.

Rapid modernization of the American public road system and universal motorization of public road use have given rise to sharp conflicts of interest among various classes of highway users, groups of taxpayers and competing forms of transportation.

Efforts to resolve these controversies have been inconclusive, primarily because of the wide difference of opinion with respect to the basic purposes served by public roads, nature of benefits created and distribution of these benefits among various groups of society.

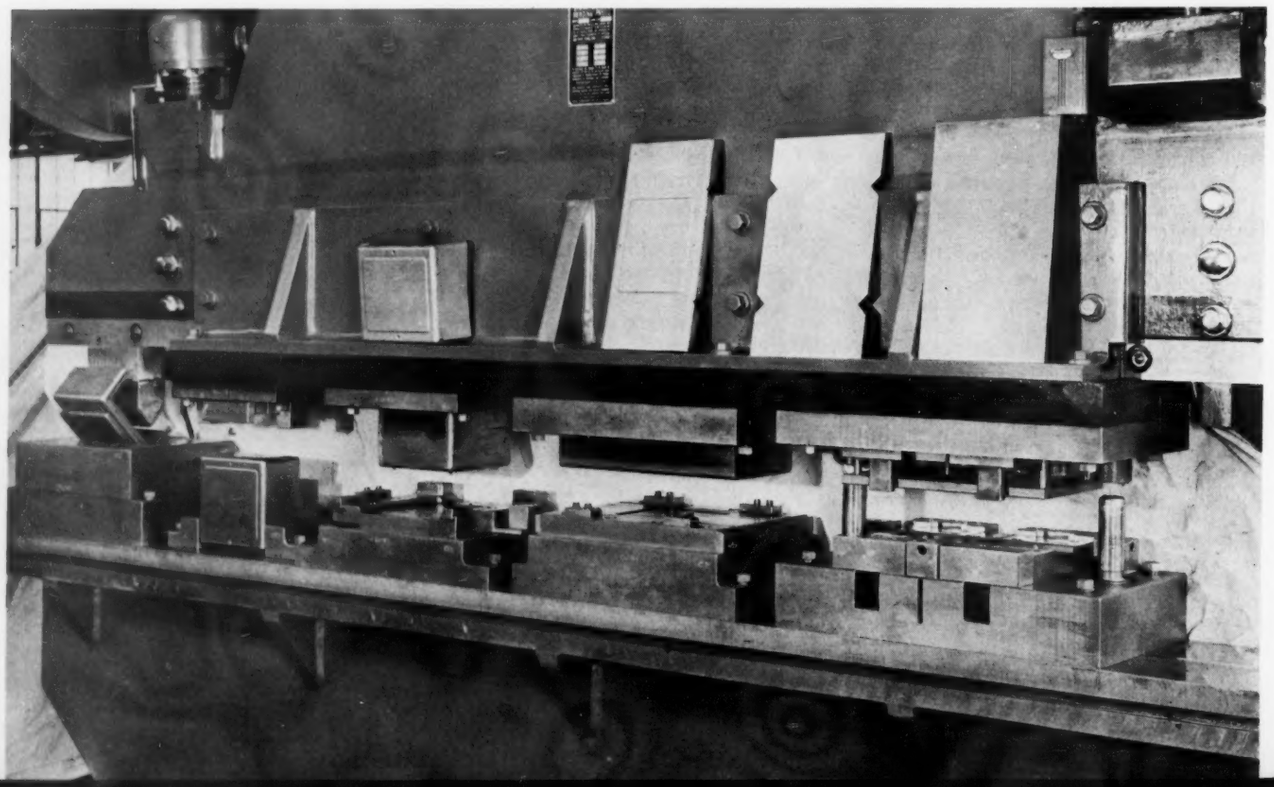
The purpose of this study is to clarify main issues involved in public management and to formulate a set of principles which may serve as the basis for distributing authority and responsibility among levels of government and the financial burden among taxpaying groups.

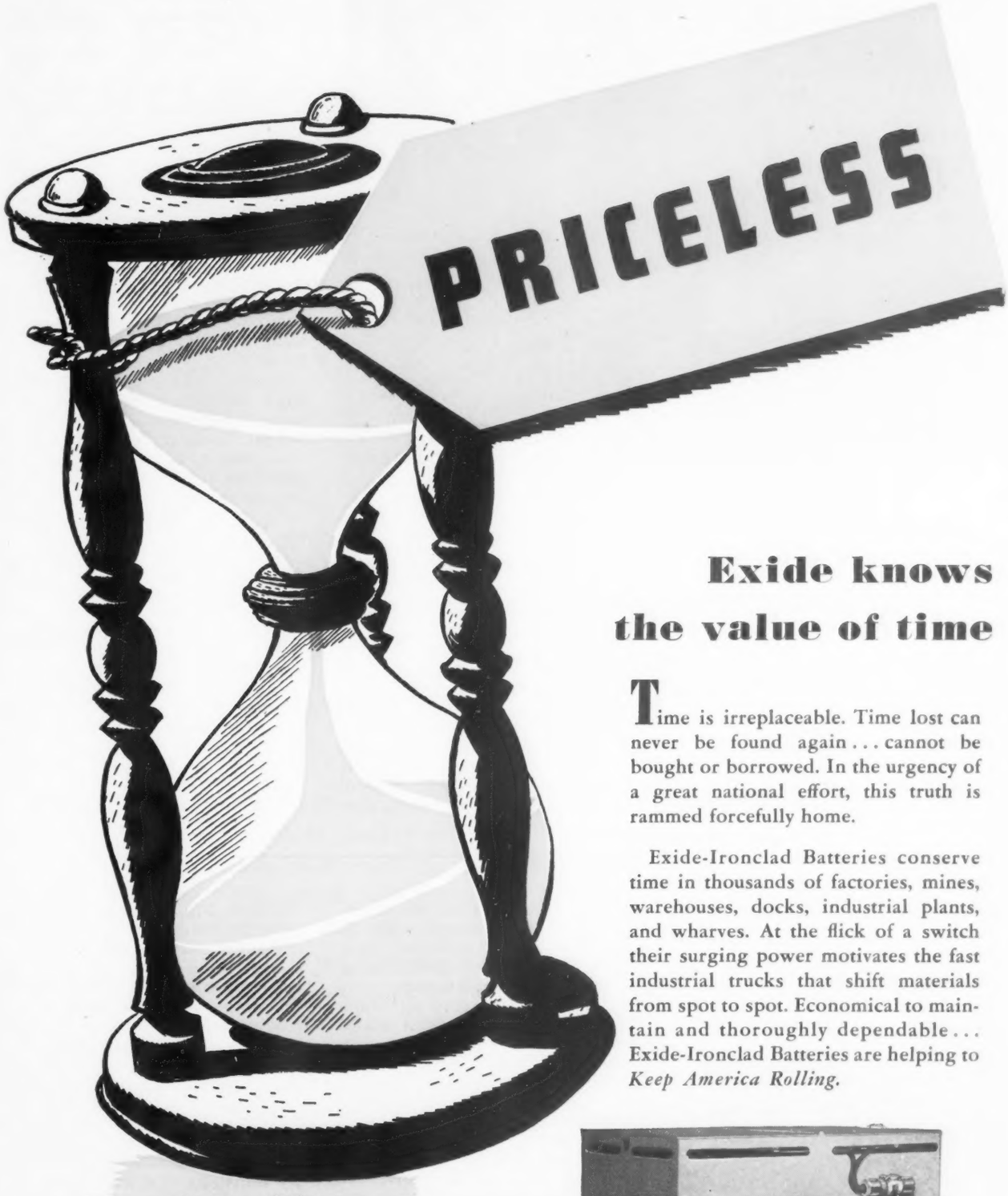
Bending Press Handles Progressive Stamping, Forming Operations

■ THE VICTORY program has made it necessary to use available tools, the adaptation for certain operations being somewhat unusual yet with sometimes surprising economy. Accompanying illustration shows how a manufacturer met a production problem when his raw materials for making zinc castings were cut off. Not so readily shown is the fact that the new method proved a considerable economy. The small sheet steel box was designed, dies and machinery made and in production within 60 days. The manufacturer could not get draw steel so he uses the stock he had available which had a wide commercial variation in gage thickness.

The bending press shown is a Model B-6 Sturdybender, manufactured by Cyril Bath & Co., Cleveland, which likewise furnished the design and dies to complete the job. The first operation is to blank and pierce the piece; the second is to emboss the forward face of the box and turn up the flanges. Three more progressive operations completed the piece, together with protrusions for welding on the side walls of the box, which is the final operation.

Safety devices were later fitted to the press. One operator produces 35 or 40 boxes per hour. The advantages claimed for this setup are: First, it avoids the need of special drawing steel. Second, the box is complete in the hands of the operator without being put down or conveyed to another press thus affording a marked saving in handling time. Third, the floor space requirements are less than if the job is done on a number of separate tools. Fourth, the cost of operating one press with a 5-horsepower motor is materially lower than if the work were done on a series of presses with individual mechanisms, all requiring attention. A fifth advantage from the manufacturer's standpoint is that the dies for this process are less costly than draw dies, and that the bending press itself is a type of tool having a wide usefulness for other types of work, should the existing need cease.





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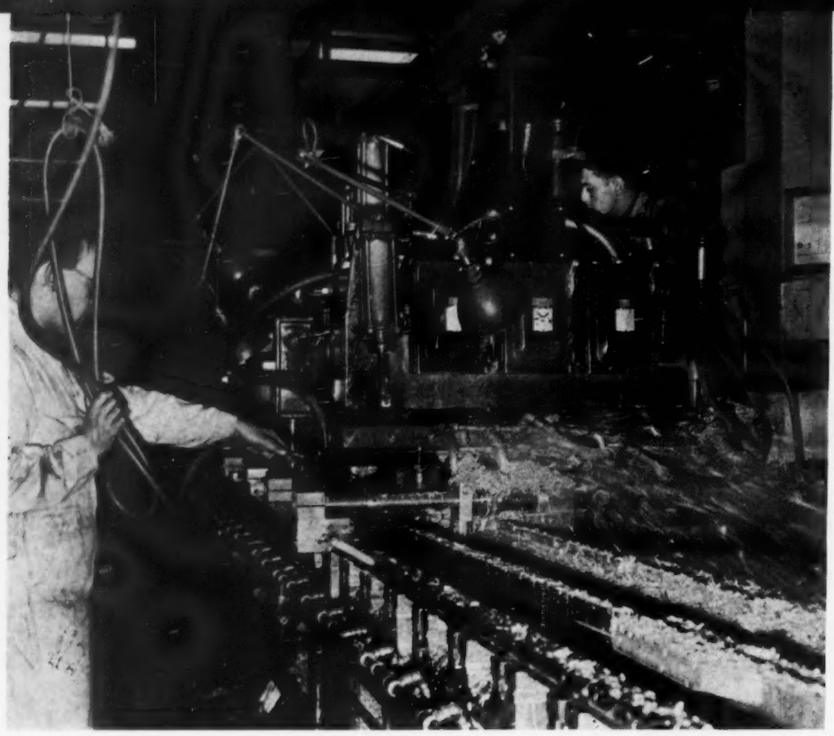


Miller carriage travels at speeds of 3 to 18 feet per minute down length of 30-foot machine. Three high-speed cutters remove easily 42 cubic inches of duraluminum per minute. Operator rides platform that moves with carriage to operator controls at back of machine while two helpers load parts

CUTS MACHINING TIME

. . . . from 90 to 2 1/2 hours by high-speed milling

■ HIGH-CYCLE milling machine which effects a saving of three and one-half days of production time per plane on the P-38 interceptor is now in use at the Lockheed Aircraft Corp. plant No. 2 in Los Angeles.

The machine, designed by Rudolph Onsrud in collaboration with the plant engineering department of Lockheed, and built by the Onsrud Machine Works, Chicago, is said to be the first of its kind to be used in the aircraft industry, although it appears somewhat similar to the Farnham cap spar milling machine in use at Bell Aircraft Corp., Buffalo, and some aircraft parts plants.

Lockheed has found that in machining the ten extruded aluminum beams necessary for each P-38 plane it was formerly necessary to expend a total of 90 machine hours; a figure now reduced to 2 hours and 20 minutes, or a saving of 87½ hours per plane.

Milling of long maximum extrusions on tapers with cut-outs in flanges and various other cuts for weight reduction is a difficult problem. Due to their length and awkwardness in handling, it has been impossible to put these extrusions on a conventional machine, laying out each individual part.

The Onsrud extrusion miller is 30 feet in overall length, with a cutting area 12 inches wide and 20 feet in length. The carriage travels on ways by means of rack and gear, giving a speed range of 3 to 18 feet a minute in either direction.

A platform is built on the back of the carriage, on which the operator stands about 15 inches off the floor, riding the carriage as it shuttles back and forth the full length of the part. Two helpers on the floor

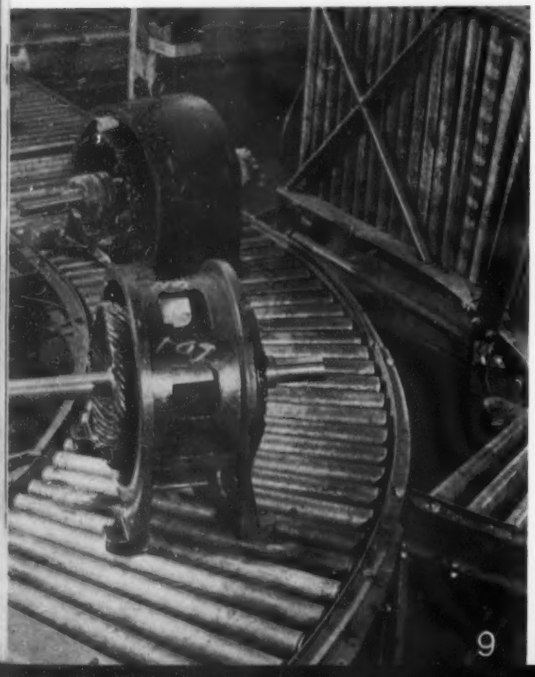
(*Please turn to Page* 92)

Tripling Production

(*Concluded from Page* 55)

ical effort is involved in handling heavy parts.

The discovery of an entirely different method of testing motor windings has resulted from the introduction of high-frequency power as used for radio transmission. This in turn is utilized to speed testing operations, **Fig. 6,** and to make tests more precise. By using ultra-high frequencies, motor windings can be tested at high voltage but with only a small amount of current. The insulation is checked without roasting out a good winding, yet a weak winding is immediately detected and discarded. This method of testing locates weak spots in the insulation in a much more thorough manner than can be done with conventional methods of testing and at the same time is extremely fast. Note the conveyor setups for handling the work to and away from the testing station in **Fig. 6.** Stops or gates are used across the gravity roller conveyor to stop the flow of stator frames at the test station.



To speed assembly operations, motor shafts for standard types of motors are machined in quantities in semi-automatic machines and then are stored in considerable volume in stock sections such as that shown in **Fig. 5.** Thus there is no delay in assembling rotors, yet production of shafts is speeded because a large run can be made on the machines before it becomes necessary to change over to another size or type of shaft.

Roller conveyors are found all over the plant, the lines being arranged so flow of materials can be varied easily to fit particular production requirements. For example, in **Fig. 9,** the stators and their rotors are seen traveling down a gravity conveyor. Yet note at the right that a hinged section can be let down over the conveyor section at the left foreground to permit a different flow across the conveyors.

To cut pattern wear in making castings, metal patterns are utilized since castings can be produced from these in large quantities, yet the castings will be of high quality with smooth surfaces. A few of the metal patterns used for casting various motor parts are shown in **Fig. 7.** Wooden patterns would wear out too quickly if utilized in such work.

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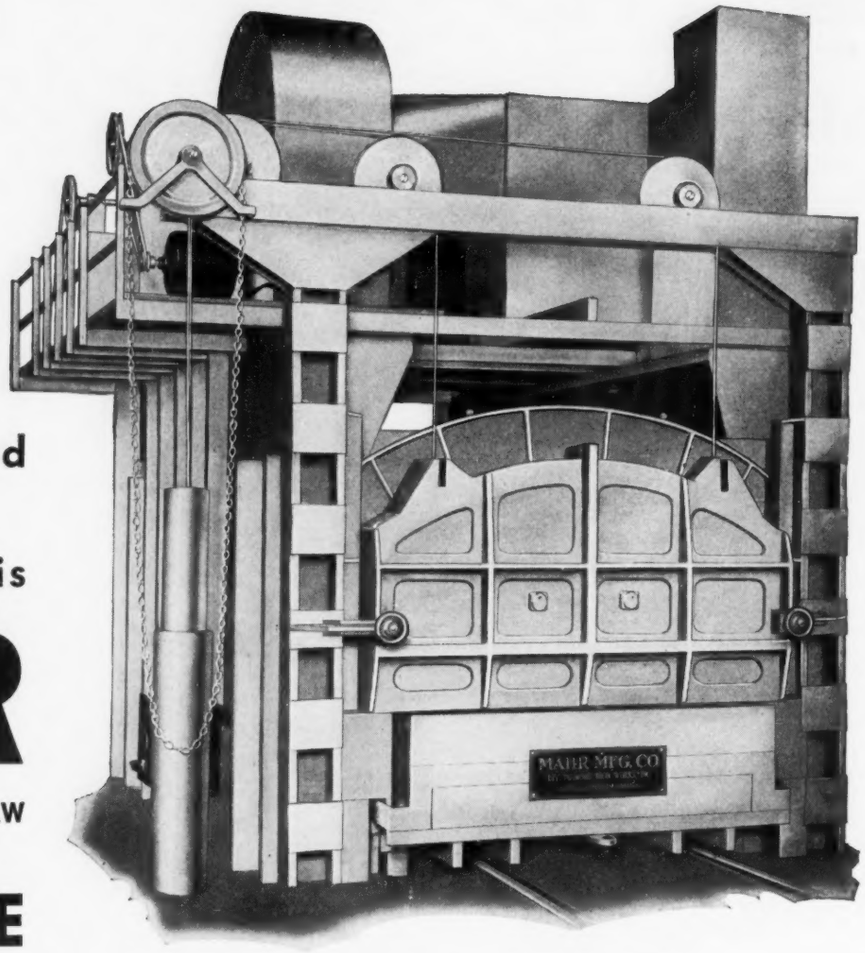

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TANK TRACK PINS

. . . . are nitrided by mass production methods

By ROBERT G. GUTHRIE
Consulting Metallurgist
Chicago

■ ALMOST ALL TANKS used by the United States and British Armies are fitted with endless treads made from rubber sections. Each individual rubber tread section is joined to its adjacent sections by means of two pins extending through the rubber section and into heavy connecting links as shown in Fig. 1.

The track pins are assembled with the links to build up the complete tread from the rubber sections as shown in Fig. 2. A typical pin is 9½ inches long, ¾-inch in diameter. It is used to tie together the rubber sections forming the track shoes in much the same manner as a hinge pin. A typical tank requires 140 pins, 70 for each of the two continuous tracks.

At the plant of the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., these pins are being heat treated at the rate of 20,000 weekly. An important part of the heat treating cycle is the nitriding operation designed to put a hard, wear resistant surface on the pins. They are nitrided to a depth of 0.025 to 0.030-inch.

The material forming the pins is a Nitralloy G modified steel which analyzes 0.30 to 0.40 per cent carbon; 0.30 maximum silicon; 0.40 to 0.60 manganese; 1.40 to 1.90 chromium; 0.15 to 0.25 molybdenum; 0.90 to 1.40 aluminum.

Prior to being nitrided, the pins are heat treated by oil quenching from a temperature of 1650 degrees Fahr. Subsequently they are drawn at 1350 degrees Fahr. This treatment produces the following physical characteristics: 123,000 to 145,000 pounds tensile strength; 15 per cent elongation in 2 inches; 45 per cent reduction of area; 45 foot-pounds minimum izod.

A typical nitriding load shown in Fig. 3 contains 10,000 track pins and weighs 12,000 pounds. In preparing the load for the nitriding operation, a cylindrical fixture is used. The bottom layer of pins first is set onto an alloy grid which rests in the bottom of the cylindrical fixture. This fixture is simply a cylindrical sheet which does not quite encircle the grid. Through the opening the operator can insert the pins onto the grid. The circular sheet keeps pins from falling off grid. When layer has been placed, circular sheet is raised part way to allow a steel band to be placed around lower portion of pin layer. Then circular sheet is raised to almost clear top of first layer of pins while a second steel band is applied. The process is repeated as subsequent layers of pins are placed. The bottom layer consists of 2000 pins packed solidly. When the five layers are completed, the load is lifted from the fixture and lowered into one of the two Lindberg Cyclone nitriding furnaces.

These units are equipped with alloy retorts 38 inches in diameter and 54 inches deep. Self-sealing insulated covers are provided. Ammonia is introduced through pipes extending through the cover. The furnaces are gas fired and are of the forced convection type in which heated air is circulated under pressure and at high velocities.

Since the retort is heated by forced convection, there is no chance for radiation to affect uniformity of the temperature produced in the work. Loads handled are staggered between the two furnaces so one heat is available at the middle of the week and the heat from the other unit completed at the end of the week.

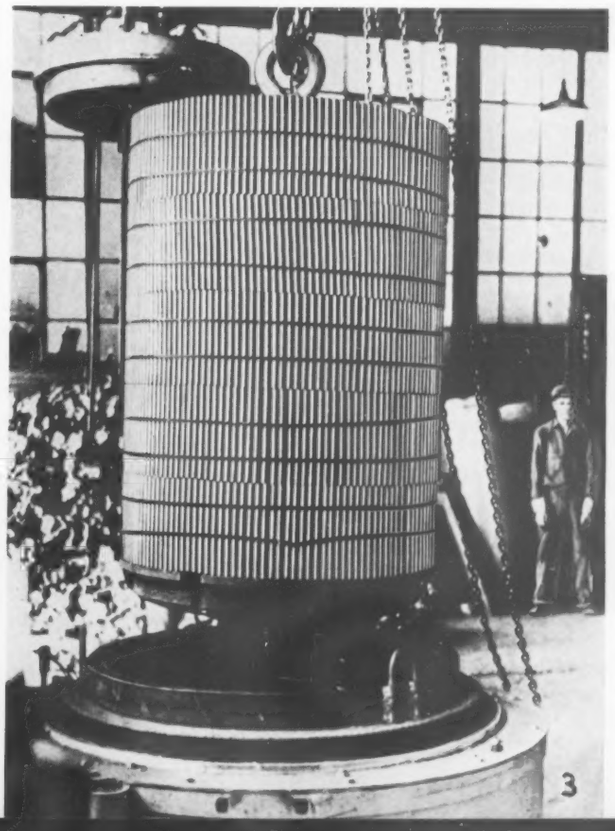
Since it takes approximately one-half week for completion of the nitriding cycle, weekly production of 20,000 pins therefore is available.

End-to-end runout specifications on straightness are 0.01-inch maximum. However, it has never been necessary to reject a pin due to warpage. In the period of approximately 6 months since installation, over 300,000 pins have been nitrided without the loss of a single pin.

Fig. 1—Rubber sections assembled to form track for tanks, using pins and end links to connect sections

Fig. 2—Workmen assembling rubber sections to form completed track

Fig. 3—Right, 10,000 pins to join track sections are shown here loaded on fixture ready to lower into a Lindberg Cyclone nitriding furnace



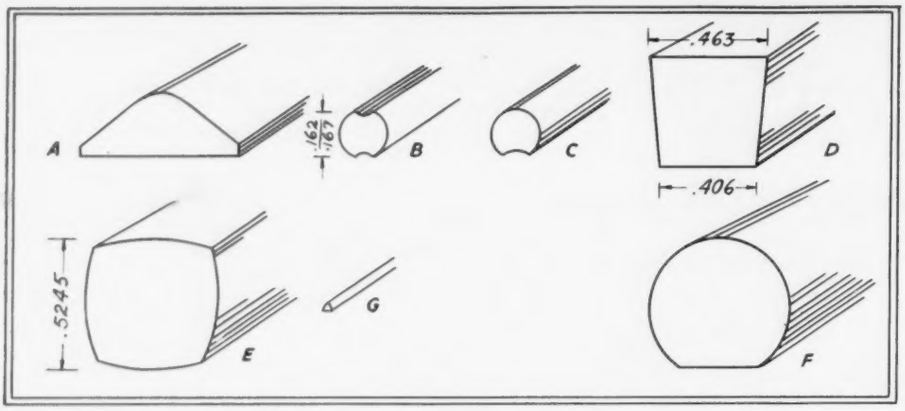


Fig. 1—Some of the special shapes of steel parts that are being produced by carbide die drawing process

Use of CARBIDE DIES For DRAWING SPECIAL SHAPES

Parts drawn to close tolerances now are being produced on a large scale by the carbide die drawing process. Many mills equipped with shape-die finishing equipment buy their dies in the rough-cast state and finish them to desired specification. Importance of proper die maintenance is discussed

By JAMES R. LONGWELL
Chief Engineer
Carboloy Co. Inc., Detroit

■ INTRODUCED more than a decade ago, cemented carbide wire drawing dies are today regarded as standard tools of the wire industry. Wherever appreciable wire drawing is performed, there carbide dies will be found. However, in the past few years a widening scope of uses for carbide dies has developed in steel mills as well as in companies working with brass and aluminum.

Rapidly increasing in number are the applications of special carbide dies to the production of special-shaped parts of uniform section, required in relatively large quantities. This is particularly true since the inception of the Defense program and in connection with the production of parts on which close tolerances must be held in large scale production, which makes the use of steel dies for this type of drawing work prohibitive from the standpoint of number of dies required over a given productive run.

Thus, today, carbide drawing dies fall, generally speaking, into one of the three following classifications:

1. Conventional round wire drawing.
2. Drawing of standard shapes (hexagon, square, etc.)
3. Drawing of special shapes of wire and of special-shape parts as an alternative to machining from bar stock.

While steel dies still are being extensively used for the third mentioned class of work, carbide dies are being applied where close tolerances must be maintained over long runs. Today, carbide dies are consistently producing parts—by drawing—to "machined" tolerances.

Cemented carbide nibs for dies do not, of course, eliminate the necessity of scrapping dies when they have worn oversize. However, the extremely long life and high resistance to wear of carbide dies change the cost picture materially. Though such dies are more costly from the standpoint of basic material, the expense and time of finishing the dies—whether of carbide or steel—usually far outweighs the material cost.

Wire Drawing: As far as drawing round wire with carbide dies is concerned, practices are now fairly well established. In recent years there have been a number of improvements in die finishing equipment, but such improvements have been detailed rather than fundamental.

One point perhaps might be well to keep in mind under today's conditions. With demand for wire at a peak and mills straining effort to maintain production at high levels, proper die maintenance procedure has become more important than ever before. Dies should never be allowed to wear until a deep ring has been formed. They should be touched up, if necessary, every time they are returned to the die room—and as soon as they do, so that they will be ready when needed. Regular touching up of dies eliminates, to a large extent, the necessity of re-cutting dies, eliminates tie-ups, reduces down-time of mill equipment, reduces spoilage, increases mill tonnage—and, peculiarly enough, actually results, in nine cases out of ten, in cutting down on the number of man-hours required to finish and refinish dies.

Standard Shapes: Drawing of special shapes with carbide dies is a more recent development and has been materially stimulated by the introduction of shape-die finishing equipment. With this equipment, mills are now able to purchase rough-cored dies and finish such dies themselves. The finishing equipment also is used to keep the die in condition. In addition to die finishing equipment, the shape-die equipment available includes machines for producing the special laps needed for the shape dies. One practice fairly widely followed is to save the first lengths drawn through the shape die to cut up for "laps" for use when reconditioning the die. Laps produced in this manner may be used even if slightly undersize with respect to the desired hole dimensions, by applying side pressure to the laps when lapping.

It should be noted, however, that many special shape dies are still being produced from round hole dies. Mills faced with the requirement of relatively short runs on special shapes find it quicker and more economical to produce the necessary special die by shaping a round hole die available on the mill's shelves. Where a single die or set of dies suffices for the run this procedure is still less costly than ordering a single special-shape cored die, in addition to the time saving involved. However, it should be noted that this method is satisfactory, mainly when the shapes to be produced are relatively simple in character.

However, in most cases, special-shape dies rarely require much resizing. Most special shapes are produced to a single size. When the die has worn oversize, there is little that can be done except scrap the die for that particular type of work. Sometimes such dies can be re-bored and converted to other types of work, however, at the mill or by the die producer.

Despite these seeming handicaps, more and more highly specialized

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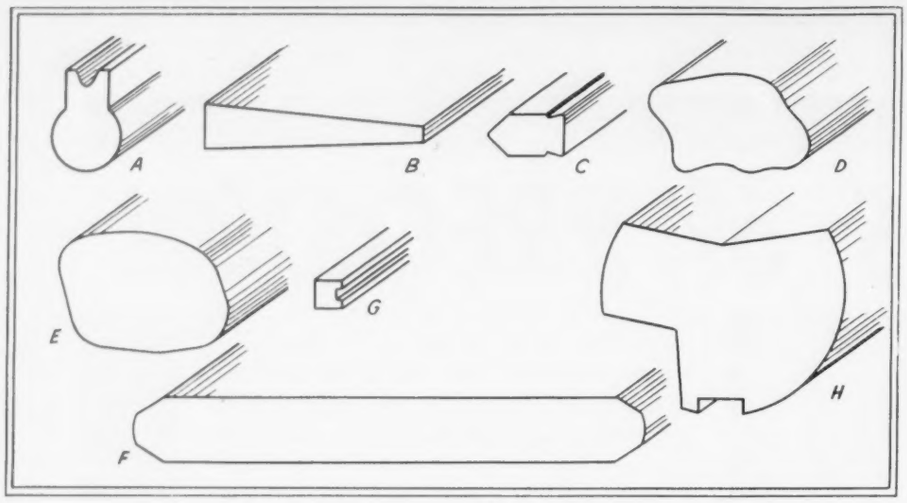

Fig. 2—Some of the intricate shapes of brass and other nonferrous metals produced with carbide dies

shapes are being drawn with carbide dies, thus evidencing the economy of their use.

Machining by Drawing: Dies for this type of work do not differ radically in general appearance from conventional drawing dies. As in the case of wire drawing, breakdown dies are sometimes used at times ahead of finishing dies.

Fig. 1 shows a number of special shapes of steel parts now being produced with carbide dies. The section shown at *A* is produced in one draw with a carbide die finished to the special shape required.

At *B* is shown another specially shaped part, consisting of a round section with two accurate longitudinal grooves, toward the bearing of the die. It is to be noted that the diameter of the finished part is only a little over ¼-inch.

A single-groove variation is shown at *C*. For this section die tolerances called for plus zero minus half a thousandth.

A keystone shape is shown at *D*.

Ahead of the finishing die for the part *D* is a breakdown die which produces the shape shown at *E* from round wire. Therefore, the shape *D* is actually drawn in two stages, the second draw being from stock of the section shown at *E*.

A D-shaped section, *F*, is another drawing job which required holding dies to close limits—plus nothing, minus 0.0005-inch.

A special triangular steel shape on the small side is shown at *G*. Here the maximum finished dimension is only a little over 1/64-inch.

Nonferrous Parts: Though steel mills have advanced a step in producing special shapes by the carbide die drawing process, the intricacies of shapes are nowhere near those to be found today already in drawing of brass and other nonferrous metals with such dies. Fig. 2 shows a group of such sections.

The part shown at *A* is particularly striking for its intricate shape. It will be noted, that die tolerances are held to 0.0001-inch with all tolerances on the plus side only.

The section shown at *B* is a commutator bar. Such parts are now produced in large quantities and in a variety of sizes by drawing through carbide dies. Another complicated symmetrical shape is shown at *C*. The part having an overall dimension of only around ¼-inch. Tolerance on all die dimensions is plus zero, minus 0.0005-inch.

One of the most unusual irregular shapes now drawn with carbide dies is shown at *D*. The various radii indicated are all specified to four decimal places. At *E* is shown the section of the *D* part as it entered the die. This shape *E* is also produced by drawing, holding all die dimensions to 0.0025-inch through the breakdown die. There is a considerable reduction in overall size between the parts at *D* and *E*, indicating the amount of deformation of the material required.

Another minute section is shown at *G* in enlarged form. Maximum width of the section is only a little over 1/64-inch, with die dimensions specified to tolerances of plus or minus 0.00025-inch.

An irregular brass part formerly produced by milling is shown at *H*. It is now bench drawn to the final shape and cut into the desired short lengths, without needing any machining operations.

This general type of part seems to hold major promise for future increases in production by drawing with carbide dies rather than machining, as the former enables manufacturers to produce parts to extremely close tolerances and identical in every detail, resulting in parts with dimensions held to the same limits as in machining.

The latter is particularly important in progressive assembly work, where one misfit can cause a great deal of trouble.

In addition there is the not inconsiderable saving in production cost involved, which in some cases might easily mount up to 90 per cent of the original processing cost.

"High-Altitude" Welding

■ **Seventy-five feet above the Mississippi river, this operator is welding the 16-gage steel sheet sections forming the roof over the toll house of the $2,500,000 Centennial bridge, connecting Rock Island, Ill., and Davenport, Iowa. Steel sections were first attached to I-beams and the seams and bolt holes were sealed by welding. General Electric photo**

ACCURACY

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LOOKING at today's whirring defense program, the first picture is that of speed—and tremendous mass production. But behind every such picture there is one of the tool room—the *first* line of defense—where the tools and fixtures for the production line are designed and built. It is in this picture, where measurements are reckoned in split thousandths of an inch, that you will find South Bend Lathes.

Sound design, expert workmanship and quality materials give South Bend Lathes extreme accuracy for precision tool and gauge work—smooth power and speed for efficient production—time-saving versatility for economical change-overs.

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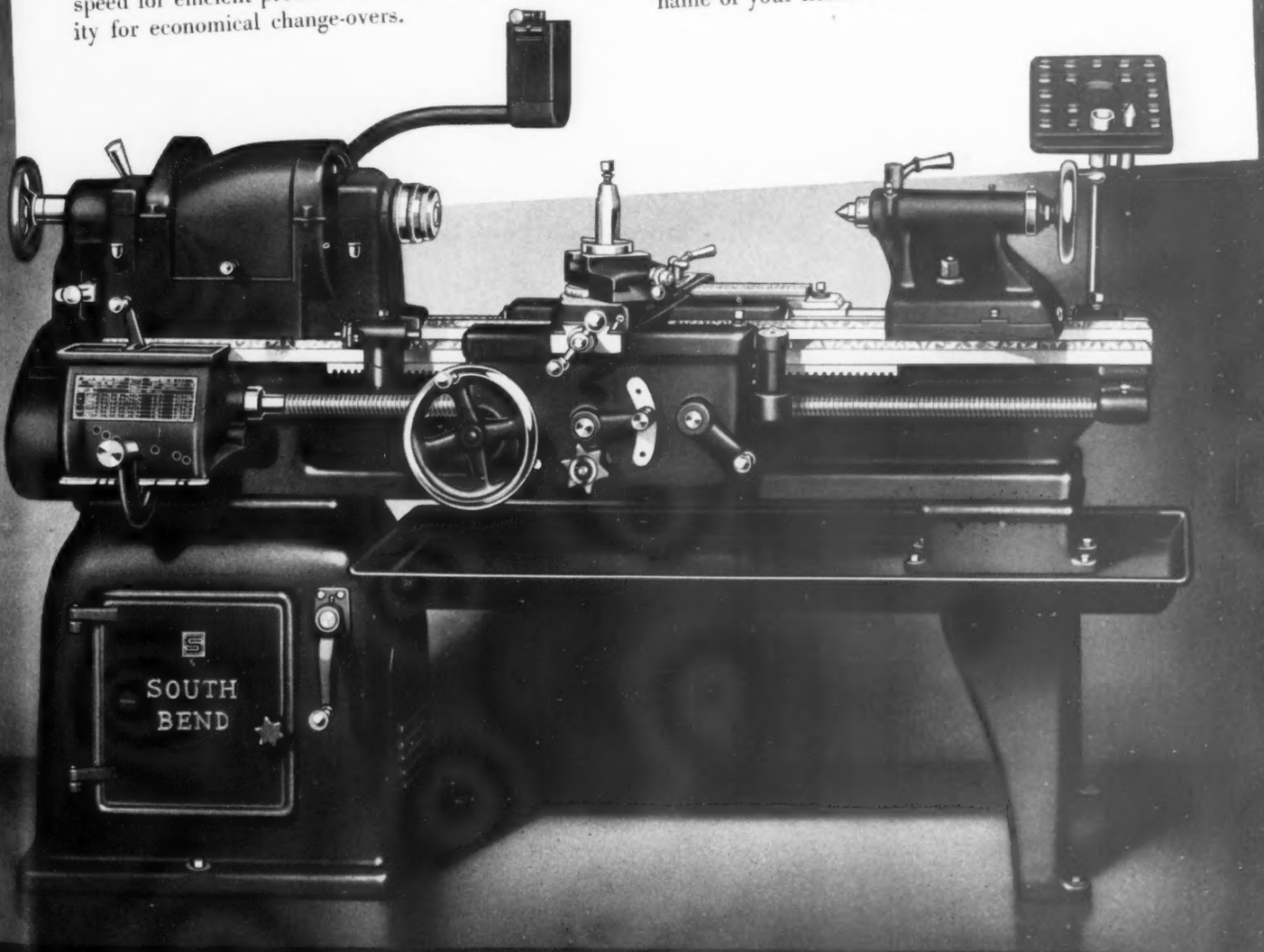
South Bend Lathes are made in five sizes: 9", 10", 13", 14½" and 16" swing, 3' to 12' bed lengths, in Toolroom or Manufacturing types, with individual motor drive. Write for New Catalog 100A and the name of your nearest dealer.



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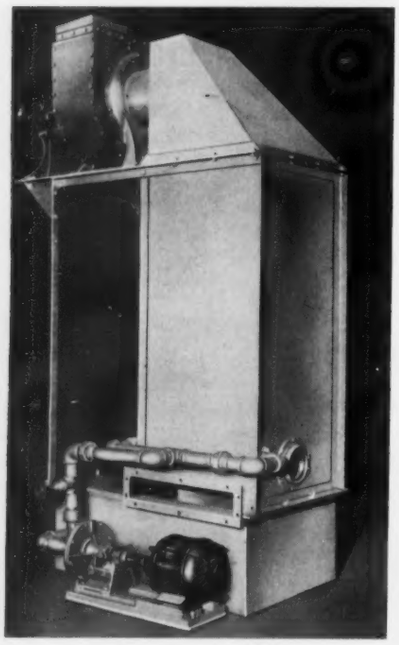
Industrial Equipment

Dust Collector

■ Industrial Sheet Metal Works, 628 East Forest avenue, Detroit, has introduced a new Hydro-Whirl dust collector capable of removing all hazards that attend the processing of magnesium and its alloys. Dust created by buffing, polishing and grinding of parts is trapped by the unit and brought down into a tank. Representing a new principle in wet



dust collecting, the equipment is said to be effective on all types of metal dusts. Mechanism of the unit consists of a rotating shaft on which are centered a series of disks. The controlled rotating speed of the shaft in a horizontal plane throws a spray of water into the baffled section of the unit at which point the dust is whirled out of the air stream.

Check-Analysis Unit

■ Metals Research Apparatus Inc., Corliss station, Pittsburgh, announces a new apparatus known as the Identometer, which makes a rapid check-analysis of metals and alloys by the use of a newly-developed form of thermocouple. It is for general use in laboratory, shipping room, inspection and tool room and for research work on new alloys. To run a check-analysis, the metal sample to be tested is fastened by means of clamps to silver contacts and held tightly against an-

other, similarly-mounted "reference" sample of a known composition. Tests on common ferrous alloys have demonstrated that the instrument is consistent in detecting even very small differences between two alloys. To extend its versatility, it is possible, with the use of a jig and two specially constructed attachments, to conduct nondestructive testing on bars, sheets, billets, ingots, etc., in their original sizes without need of cutting away special test samples. The apparatus can be set to operate on any available electric light system; however, it is standardized for a 110-volt, 60-cycle alternating current circuit.

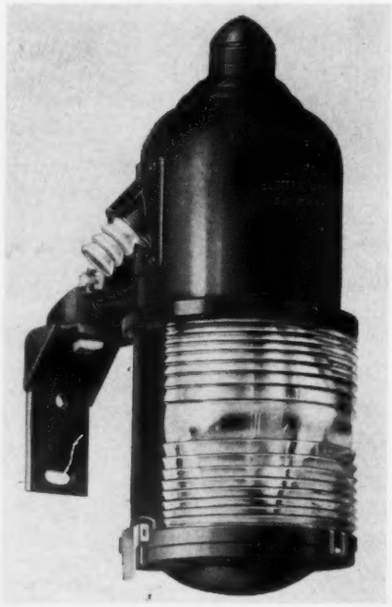
Double-End Grinding Unit

■ Brown-Brockmeyer Co., Dayton, O., has placed on the market a new double-end grinding unit which features a deflected base enabling the operator to get closer to the work. Its large spindle is supported by two heavy duty bearings which are located near the wheels to eliminate vibration. Wheel guards are equipped with removable end shields and an exhaust outlet. Spark shields

and wheel lights also are embodied and are adjustable for wheel wear. The lights utilize low voltage bayonet type automotive bulbs. Lamps are guarded against damage and their current is supplied from the motor winding. A push-button motor starter with overload protection also is included.

Defense Light

■ Revere Electric Mfg. Co., 2949 North Paulina street, Chicago, has placed on the market a new type floodlight for defense and protective lighting. It produces a light-beam pancake in shape, throwing the light across fences surrounding ordnance plants as well as areas adjacent to industrial properties, yards, docks and oil refineries. Of rugged construction, it can be used for multiple or series circuit use, employing 180-degree fresnel lens. The floodlight's cast iron housing is dust-tight and weatherproof. Its focusing mechan-



ism is externally operated. The glare produced is of such strength as to blind any intruder approaching the lighted area, while the guard inside the fence can see every move without being detected.

Current Transformer

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new 1200-volt current transformer for low voltage, outdoor metering service. It is said to be the first of its kind available at a rating below 5000 volts. Known as the WO-1 dry type current transformer, it has three ratings, 200/5, 400/5 and 600/5 amperes. Its design permits long range accuracy since it is good for 150 per cent normal current continuous operation without exceeding 55 degrees Cent. rise with a 40-degree Cent. ambient. Mechanical strength against instantaneous overcurrent is 250 times normal current root means square first peak, and thermal capacity of the windings

There is *no shortage of Torrington Needle Bearings* for priority applications . . . they can be delivered with the promptness you need to maintain your production schedules!

When the Needle Bearing was introduced eight years ago, design engineers in every field quickly recognized its unusual merits. Encouraged by the steadily rising sales that confirmed industry's growing acceptance of the Needle Bearing, Torrington began a program of plant expansion designed to permit wider utilization of the bearings' potentialities. With the beginning of defense activities, indications of still heavier demands provided the basis for further expansion, and today production is geared to meet the needs of the Victory program.

The Needle Bearing has already demonstrated its efficiency in countless industrial applications, where its small size, low cost, high capacity, ease of installation and lubrication have made possible improvements in product design and operation, or reductions in manufacturing costs. And today there is a still more important reason for the use of the Needle Bearing—its availability for *prompt* shipment on rush orders.

You can eliminate one source of production delays by planning *now* to incorporate the Needle Bearing in your designs. Torrington engineers will be glad to work with you in adapting the Needle Bearing's advantages to your specific problem. For full details write for Catalog No. 110.

NO SHORTAGE HERE!

THE TORRINGTON COMPANY
TORRINGTON, CONN., U. S. A. • *Estab. 1866*
Makers of Needle and Ball Bearings
New York Boston Philadelphia Detroit
Cleveland Chicago Los Angeles Seattle
San Francisco Toronto London, England

TORRINGTON NEEDLE BEARING

EFFICIENT OPERATION

Torrington Needle Bearings permit anti-friction construction at important points in A.C.F. passenger coaches, giving smooth, efficient operation. Needle Bearings contribute also to reduction in need of service attention, because of their long life and efficient lubrication.

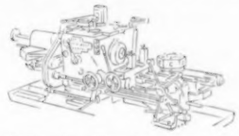
THE A. C. F. MOTORS COMPANY

SAVINGS IN WEIGHT

Needle Bearings themselves are light in weight, and their simple design often permits additional weight savings through simplification of surrounding parts. These advantages are especially important in aircraft applications—for example, in Republic's P-43 "Lancer" pursuit plane.

REPUBLIC AVIATION

LONGER SERVICE LIFE



Use of Needle Bearings at six locations on the power automatic chuck unit of Warner & Swasey's No. 2 Turret Lathe results in longer life of the unit, insures smooth operation as well. High capacity and small size of the Needle Bearing are additional advantages in this application.

THE WARNER & SWASEY CO.

Be Prepared for Air Raids

WITH Carey BLACKOUT PRODUCTS

These Scientifically Developed Products Provide Maximum Protection to Property and Personnel

A blackout, to be fully effective, must guard against two definite conditions —prevent reflection of outside light— provide protection against flying glass. Carey Blackout Products ideally meet both of these requirements.

Civilian Defense Bulletin says: **"A factory may be well blacked out, but its glass windows may reflect the light of moon, stars, fires or flares." The practical answer to this problem is to apply Carey Blackout Coating to outside surfaces of all skylights. This coating is non-reflective and insures complete light stoppage with one coat.**

Civilian Defense Bulletin says further: **"More injuries from flying glass are to be expected than from bombs or bomb fragments." Guard against this danger by applying any one of the three types of Carey Blackout Board to the inside of windows. Boards are rigid; cut to size; easily installed; quickly removable.**

Carey Blackout Products are economical and effective because they are specifically designed for blackout use. Proved right by tests. Write today for prices and details. Address Dept. 71.

BLACKOUT COATING—For indoor or outdoor application. Will last indefinitely inside and give upwards of two years satisfactory service outside. Inexpensive; easily applied with large brush, or may be sprayed on; quick drying. Covering capacity 350-400 sq.ft.per gallon. Easily washed off with naphtha, benzol or other solvents.

BLACKOUT BOARDS—Laminated asphaltic boards of good rigidity for removable panel installation. Moisture and condensation proof. Boards are easily cut to shape and size.

ALL-PURPOSE TREATMENT—Where a more permanent, weather proof, or exterior treatment is desired, use the Carey Laminated System. Apply a thick film of Careyclad Coating and embed 30-lb. Carey Felter (or Carey Asphalt Saturated fabric membrane) topping with a finish of Careyclad Coating. This provides complete Blackout and renders the glass shatter-proof.

BLACKOUT PAPER — Always keep several rolls of Carey Blackout Paper on hand for quick, temporary repairs. For best results, use a light weight Carey Smooth Roll Roofing or the less expensive Carey No. 7 FibreWove, a tough asphalt saturated and coated building paper, weighing only 10 lbs. per 100 sq. ft.

REJUVO SYSTEM OF CAMOUFLAGE—During the past year, we have been working with the U. S. Engineers in developing the Rejuvo System for camouflage purposes and a number of trial installations have been made. This special material and equipment for its application are available through the Carey Branch Office organization.

THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND . . . CINCINNATI, OHIO
IN CANADA: THE PHILIP CAREY COMPANY, LTD.
Office and Factory: LENNOXVILLE, P. Q.

will permit 70 times normal current for one second.

End frames of the transformer completely surround the wound coils. The unit is enclosed in a welded steel case with strap primary terminals, and the mounting plate is slotted for pipe frame or single cross arm mounting.

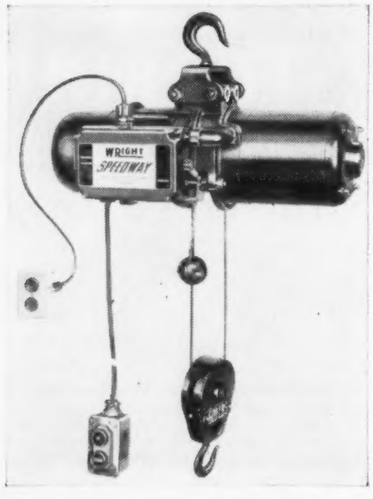
High-Speed Drill

■ Mall Tool Co., 7740 South Chicago avenue, Chicago, has placed on the market a new model 144 drill suitable for production purposes.

Light in weight, it is powered for high speed drilling, and is particularly adapted for use in confined quarters. Its overall length is 8½ inches. The no load speed of this ¼-inch drill is 4000 revolutions per minute.

Electric Hoist

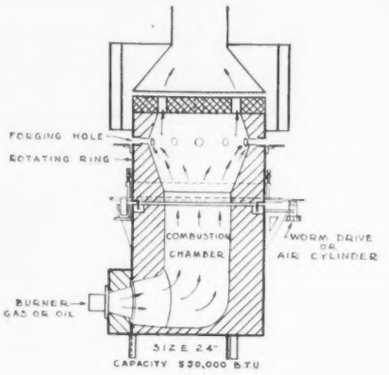
■ Wright Mfg. Division, American Chain & Cable Co. Inc., Bridgeport, Conn., announces a new Speedway light weight wire rope electric hoist for capacities 250 to 1000 pounds. Portability and flexibility are its outstanding features. It embodies a push button control, weather, acid and dust-proof preformed hoisting cable on drum winding. The hoist



is offered furnished for lug, hook or trolley suspension. It can be mounted parallel or crosswise to the runway beam when used with a trolley. It is available for 110 or 220-volt single phase 60-cycle or 220 or 440-volt 3 phase 60-cycle current.

Forge Furnace

■ Rhode Island Tool Co., Providence, R. I., has placed on the market a new Ritco rotary forge furnace, feature of which is its ability to handle burned gases to provide a uniform heat. Offered in 24 and 36-inch sizes, it has a very fast reducing heat, permitting a greater capacity for its size. The burner may be fired by bunker oil, Nos. 2 or 3



fuel oil and natural or artificial gas. The forge ring is indexed by depressing a foot control, leaving the operator's hands free for handling stock and controlling the forging machine. Forge rings can be furnished to accommodate a wide range of stock sizes. Rings for the 24-inch furnace will handle stock ⅜ to 1¼ inches; rings for the 36-inch furnaces will handle stock 1¼ to 2½ inches. These may be interchanged, even when hot, so production need not be interrupted when a new job is started.

Selective Strippers

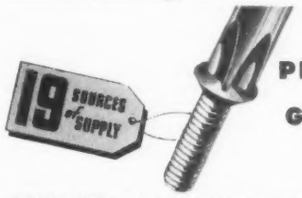
■ Strippit Corp., 1200 Niagara street, Buffalo, has developed selective strippers for use in conjunction with its line of Wales hole punching dies. These, equipped with three removable and interchangeable springs, provide a tension selection of 1, 2, and 3-spring pressure for the exact stripping action required by various gages and types of metal. According to the company, any metal that can be punched can be stripped with tension of three springs. Lighter gage metals not requiring full stripping pressure can be punched on smaller, more economical presses by eliminating unnecessary high spring pressure. The new stripper gives good stripping control besides making

Faster Driving • Fewer Operations • Stronger Fastenings = 50% Less Assembly Cost with Phillips Screws!

Consider the more frequent use of power drivers with Phillips Screws. There's no danger of driver point slipping from a Phillips recess, so there's no need to go slow. Phillips cuts actual screw-*driving* time to a fraction.

Add the saving through eliminating the extra work required with slotted screws—drilling pilot holes, two-handed starting, withdrawing crooked screws, driving in awkward positions, etc. Phillips Screws set up tight—without split screw heads or burrs — at an average cost saving of 50%.

Busy defense plants are using Phillips for double-quick assembly *speed.* Non-defense plants use Phillips for 50% less assembly *cost.* Get the facts from one of the firms listed below.



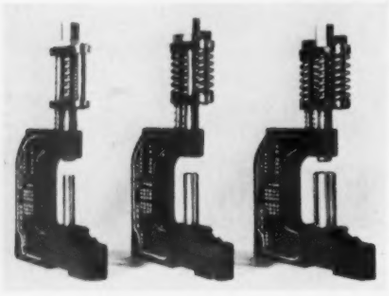
PHILLIPS RECESSED HEAD SCREWS GIVE YOU 2 for 1 (SPEED AT LOWER COST)

WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS • SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS

U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338. Other Domestic and Foreign Patents Allowed and Pending.

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N.H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N.Y.
Pawtucket Screw Co., Pawtucket, R.I.
Pheoll Manufacturing Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N.Y.
Scovill Manufacturing Co., Waterbury, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N.H.

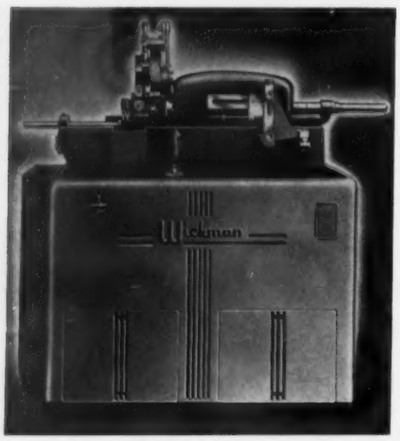
ing it possible to punch 5/16-inch holes on ¾-inch centers. The rapidity with which these parts can be removed and replaced in the hold-



ers and resetting of entire unit is said to keep presses in operation practically continuously. Dies are available in a wide range of standard and special sizes, capacities and models.

Precision Automatic

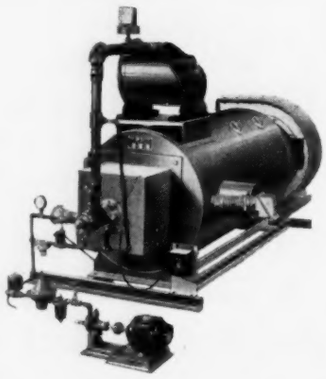
■ Wickman Corp., 15533 Woodrow Wilson avenue, Detroit, has introduced a new Swiss type high speed precision automatic particularly adaptable to the production of pinions, shafts and long slender parts used in the manufacture of precision instruments for aircraft, radio and other fields, striker pins, detonators and pinions for fuzes. Manufactured on the same principles as the machine built for a number of years by the A. C. Wickman Co. Ltd., Coventry, England, its principal features are the sliding headstock and the tool head carrying five tools which work radially. The unit uses only single point turning tools, and all are provided with micrometer adjustment in both directions. Finish, accuracy, and con-



centricity of work is maintained by a guide bushing in the tool head. This bushing revolves on a separate bearing, keeping a constant grip on the bar. It can be locked stationary and becomes a slip guide for the bar when required. When not needed, the bushing assembly can be removed, permitting the spindle nose to travel right up to the tools. Work is fed through the tools by the headstock. By a combination of headstock and tool movements, any angle or form can be produced without form tools. Many parts, even those incorporating a pivot point, can be finished in the cut-off. An endless flat belt is used in conjunction with the spindle drive. The headstock drive pulley is carried on an independent ball bearing. An accelerating mechanism, built in the gear box, speeds up the camshaft during the noncutting periods.

Oil Fired Heater

■ Despatch Oven Co., 922 Ninth street, South East, Minneapolis, has developed a new direct oil fired heater which is being offered in capacities up to 3,000,000 B.t.u. per hour with air delivery temperatures up to 1400 degrees Fahr. It is designed to burn all grades of oil at



the same time maintaining a high combustion efficiency needed for industrial applications. Its burner is of the proportioning type mounted for easy access. The heater body besides being insulated is double walled embodying extra heavy reinforcements. The combustion chamber is designed for proper functioning, and is provided with long service refractory, the latter being accessible for repairing or exchanging. Peep holes also are provided for inspecting the mixing chamber.

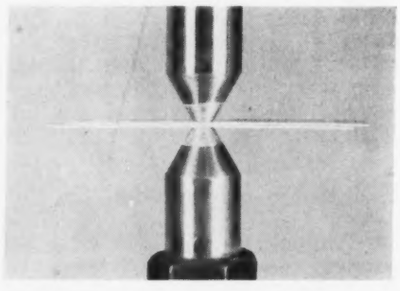
Gage Grinder

■ Ny-Lint Tool Co., 1823 Sixth avenue, Rockford, Ill., is introducing a new gap gage grinding machine which can be applied to a variety of other grinding services. It is so simple in operation that an inexperienced man can become a capable gage grinder with only a few hours training, according to the company. Double end spindle of the machine is of chromium nickel steel, mounted on high-precision, preloaded ball bearings and driven by a pulley. The table is ground to a tolerance of 0.0001-inch and is mounted on a cross slide. Its longitudinal adjustment is obtained with a precision screw working in a bronze nut and fitted with a micrometer dial read-

ing to 0.0001-inch. Cross slide is mounted on V-ways of sufficient size to insure maintenance of correct alignment. Movement toward the wheel is obtained by a lever fitted with a pinion engaging a rack on the bottom slide. All ways are protected by covers extending beyond the travel limits and the spindle bearings are sealed. Machine bed is a heavy, ribbed, semisteel casting. A door at the front of the unit's base gives access to a tool compartment. Also placed inside the base at the rear is the motor.

Electrodes for Spot Welding Aluminum

■ Progressive Welder Co., 3050 East Outer drive, Detroit, has placed on the market a line of special electrodes designed specif-



ically to reduce pick-up and increase resistance to mushrooming in spot welding aluminum. These are fitted with inserted tips of a special alloy. The tips may be secured in virtually any type of standard or special electrode shape desired.

Wire Winder

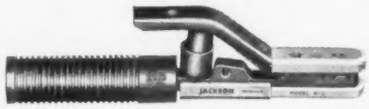
■ Fidelity Machine Co., 3908 Frankford avenue, Philadelphia, has placed on the market a new Quill winder which provides wire cloth manufacturers precision winding at high speeds. Equipped with a hydraulic control regulated by a dial stop-cock,

it winds six packages at one time with uniformly even lay and taper.

Taper is governed automatically by pressure control buttons which reverse and successively shorten the traverse in the same operation. A clutch regulates the tension to conform to speed and pick-up. Individual motor drives, automatic stop motion on feeder and winder, and yardage meter are other features of this machine. Wire can be supplied to the machine from spools or brake-controlled reels, it is said.

Electrode Holder

■ Jackson Products, 3265 Wight street, Detroit, announces a change in the design of its electric arc welding electrode holder to include a rod bender. Welders now have a quick, convenient means for pre-



paring rod for use. The result is faster welding. The line now includes ten fully and semi-insulated models, ranging in capacity from 200 to 500 amperes.

Double-End Boring Bar

■ Gisholt Machine Co., 1217 East Washington avenue, Madison, Wis., announces a new double-end boring bar for use with saddle type turret lathes. It fits into the standard flanged tool holder on the turret, then through the turret, and is held on the opposite side by a short holder, having four screws to firmly

grip the bar. This is said to make an extremely rigid bar with large single point cutters, for use with the cross feeding turret.

Reflective Panel

■ Infra-Red, 1633 East Fortieth street, Cleveland, is now offering a new No. 75 Miskella infra-red insulated reflective panel which is easy to clean and embodies simplified wiring. It is offered in ten standard sizes: 8 x 15 by lengths varying from 17 inches for 3 lamps to 51 inches for 12 lamps. The panel of the unit which is insulated with fiber glass is 1½ inches thick. According to the maker, every square inch of highly polished panel face in reflective and any single panel, whether used alone or as a part of an infra-red oven installation is quickly removable, being held with only four wing nuts. Units are available with aluminum, chromium and gold finishes.

Integral Seat Valves

■ Edward Valve & Mfg. Co. Inc., East Chicago, Ind., has introduced a new line of Intex integral seat globe stop valves for pressures to 1500 pounds at 950 degrees Fahr. The units feature a disk and integral seat faced with Stellite. Minimum weight with abundant strength has been accomplished by equalizing the distribution of metal around the body flow areas so that in heating and cooling there is no distortion. Valves are available in ½ to 2-inch sizes in socket welding, flanged or screwed ends.

Fluorescent Lamp

■ Sunray Electric Inc., Warren, Pa., has placed on the market a new 15-inch fluorescent lamp especially adapted for use where a close source of glare free light is needed. Rated at 14 watts, it is offered in both white and daylight types. Being 1½ inches in diameter it can be used with standard 20 and 40-watt lamps.

KEEP
Shells
FLYING TOO!
Forging lubricants containing "dag" colloidal graphite are helping to set new records in the production of shells . . . "Dag" colloidal graphite increases die and mandrel life, reduces sticking and improves the finish. Send for bulletin number 130K and be sure to ask for the name of your local supplier. . . . . .
"dag" is a registered trade-mark of Acheson Colloids Corporation.
ACHESON COLLOIDS CORPORATION
Port Huron, - - - Michigan
The electric-furnace graphite in "dag" products is made in the U. S. A.
dag
COLLOIDAL PRODUCTS

Cuts Machining Time

(Concluded from Page 76)

meanwhile feed the parts into the machine and keep the chips cleared away. Control panel for motors and air cylinders is on the operator's platform.

For channel cutting there is a steel fixture with attached former bar secured to the table plates by means of bolts. Channel extrusions are placed in this fixture and held by means of air clamps which have a cam and dog on each, so that when released they turn out and up to allow easy removal of the part. Three cutting heads are used. Two are vertical heads of 15 horsepower each operating at 10,800 revolutions per minute and mounted on short arms which allow them to swivel to take care of in-and-out cutting conditions. The third is a horizontal head of 15 horsepower operating at 5400 revolutions per minute.

One vertical head handles side cutouts by means of a cam secured to the former bar. The other vertical head travels through a cam roller from the same former bar as the horizontal head. Each former bar is machined on one surface the same as a finished part, eliminating any development work on these former bars. The cam rollers for each cutter are adjustable to line up the cutters perfectly so a true duplication will be maintained in the finished part. The cutter motors are started, the heads lowered by air cylinders.

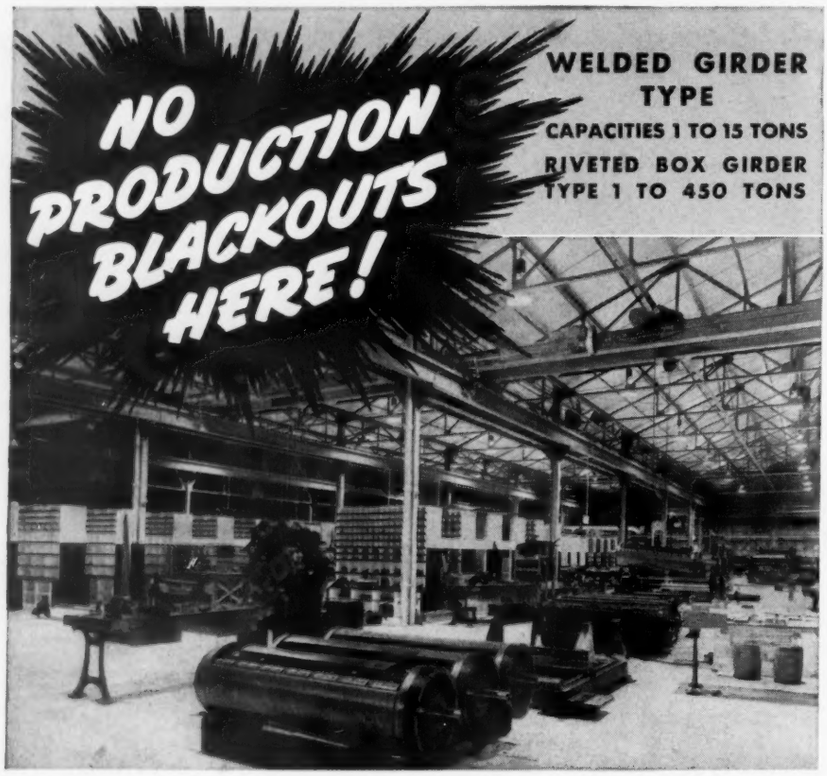
Soluble oil is pumped from a trough to all three cutter motors, which are water-jacketed. The soluble oil runs from each under pressure to each cutter, thereby lubricating as well as cooling both work and motors.

An air compressor, mounted on the carriage and also cooled by soluble oil, supplies the air to actuate the air cylinders. Cam dogs are placed on a rail underneath the bed of the machine. The carriage in motion trips a bell crank, which in turn actuates the air cylinders on the Reeves drive, which slows or speeds up the carriage feed. The cutter motors are reversible, which allows for climbing or backing out with either right or left hand cutters.

On other parts to be machined where it is not practical to clamp with air, a roller carriage is brought into use which travels on rails attached to the table tops. This roller carriage, which in turn is fastened to the machine carriage, comprises rollers spring-tensioned in both vertical and horizontal planes.

Carbide tip cutters are used exclusively on the machine, greatly improving life between grinds, and insuring better finish and less idle time. Work now being done in the miller includes one upper and one lower channel, each 20 feet in length, for the center section of the main beam of the P-38; and milling of eight cap strips, four left and four right. These are extensions of the channels into the wings and are 8 and 10 feet long.

The machine has never been tested to its maximum cutting capacity, but to date up to 42 cubic inches of duralumin has been removed per minute.



There are no costly delays in production when Shepard Niles Cranes are on the job

• Production, which is so vital to our National Defense Program, is being increased with electric cranes and hoists. Shepard Niles, because of their diversified line of material handling equipment, are saving their customers many valuable days and dollars by adapting standard cranes and hoists to meet special material handling applications.

SHEPARD NILES CRANE & HOIST CORP.

A COMPLETE LINE OF CRANES & HOISTS

358 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Offers To Aid Concerns With Federal Contracts

■ Under government requirements holders of defense contracts must file with the government duplicate copies of their drawings of the particular equipment being manufactured. These must take a definite form and must comply with definite specifications. Confidential expert advice on this problem is being offered government contractors and subcontractors by Frederick Post Co., Box 803, Chicago.

In requesting this aid it is important to state whether the contracts held are for the Army, Navy, Air Corps or whatever other federal department is involved. In addition, requests must be made upon company letterhead and signed by an officer of the organization.

New Grinding Wheel Increases Production

■ A new type precision grinding wheel called Por-Os-Way, claimed to grind 100 to 400 per cent faster, increasing production per man on each machine two to five times is announced by A. P. deSanno & Sons Inc., Phoenixville, Pa. The machine is reported to take deeper cuts, practically "breezing" through 0.010-inch.

The structure used on the wheel, instead of being sandy and compact, is stringy and porous—resembling a sponge. Air cells keep every grinding contact cool, and the wheel, due to a new vitrified bond, is hard, tough and holds the corner. It requires little dressing, and is suitable for grinding hard alloys, copper, aluminum, wood, rubber, plastics and other soft materials with minimum loading.

Offers Camouflage And Blackout Paints

■ A complete line of blackout and camouflage paints to meet current war emergency demands is announced by the Paint Division of Pittsburgh Plate Glass Co., Pittsburgh. The paints are designed for domestic and commercial use in areas subject to possible air raids, and are offered in four principal colors—black, smoke gray, earth drab and neutral brick.

Due to danger of glass breakage caused by the absorption of sun radiation by painted glass, the company makes the following suggestions: 1. The entire pane of glass should be covered. 2. Only one coat of paint should be used on the exterior. 3. A black paint gives the greatest opacity but also shows the greatest heat absorption. Neutral colors should be used on southern exposures whenever possible. 4. Danger of breakage is minimized when paint is applied to glass areas of 4 square feet or less.

Degreasing Agent Simplifies Cleaning

■ A mineral grease and dirt digestive solvent, Gunk X-11, recently developed by Curran Corp., Malden, Mass., is said to not only take the cling out of hard mineral dirt and grease accretion in cleaning tanks or vats, but emulsifies them so that they may be completely rinsed away by sluicing with a water hose. Offered in the form of a concentrate, it may be diluted with a grease solvent before use to charge large open tanks.

The solvent is said to make possible grease cleaning operations of metals on a large scale with little investment in equipment — with cleaning being carried out by cold immersion of greasy or dirty parts. Oil and dirt removed by the product disappears in the form of a milky oil-in-water emulsion which does not clog sewer drains or present a fire hazard.

Blue Print Manual for Welding Operators

■ *Simple Blue Print Reading with Special Reference to Welding;* semi-flexible simulated leather, 146 pages, 5½ x 8½ inches; 96 drawings; published by Lincoln Electric Co., Cleveland, for 50 cents, postpaid in United States, 75 cents elsewhere.

This is the second edition of this manual, which is in simple, concise language from which welders, mechanics and others can learn blue print reading easily. More than 50 drawings have been revised in this edition and eight pages of new drawings added.

The text gives the student a clear understanding of symbols used for various types of welded joints. The illustrations include practical examples of drawings of a number of machine parts, pipe connections, general construction, tanks, etc.

The engines of war are made with Ampco-equipped machine tools.

Drilling, tapping or reaming aircraft engine main bearing liners at Ampco.

TODAY, the weapons of war and the tools of peace are largely mechanized. The home, the factory, the battlefield—all are made more efficient by mechanical means.

America's foremost designing engineers—the men who are responsible for greater strides in mechanical progress — are building Ampco Metal, that sturdy alloy of the aluminum bronze class, into dominant machines where it safeguards highly-stressed parts against wear, impact, and failure. Ampco bronzes are recognized as tops where a metal that can "take it" is needed.

Gives Longer Service Life

Ampco Metal is made in six grades of hardness and physical properties, with high tensile strength, controlled hardness, excellent compressive strength, and stubborn resistance to wear, "squashing out," impact, and corrosion. It is suitable for use as bushings, gears, slides, gibs, shifter forks, and a host of other applications. Ask our engineers how Ampco Metal can help you. Literature will be sent upon request.

AMPCO LITERATURE Available

AMPCO METAL, catalogue 22
Ampcoloy—Industrial Bronzes Catalogue
Ampco-Trode Coated Aluminum Bronze Welding Rod
Ampco Metal in Machine Tools
Ampco Metal in Bushings and Bearings
Ampco Metal in Dies
Ampco Metal in Acid-Resistant Service
Ampco Metal in Aircraft
Ampco Metal Centrifugal Castings
Ampco Metal in Heavy Machinery
Ampco Metal in Gears

AMPCO METAL, INC.
Department S-2 Milwaukee, Wisconsin

AMPCO METAL
The Metal Without An Equal
AMPCO

Announcing the

1ST WESTERN HEMISPHERE FOUNDRY CONGRESS

To Promote Hemisphere Solidarity

As a step toward furthering the Government's Good Neighbor policies, Hemisphere Solidarity, and to further a united effort on the part of the foundry industries in all the Americas, a Western Hemisphere Foundry Congress will be staged in conjunction with the 46th Annual Convention of A.F.A.

Organized as a Common Defense effort, the murderous attack on PEARL HARBOR and Declaration of War with all Axis powers changes the program to an ALL-OUT effort of the Foundry Industry for increased production of WAR MATERIALS.

Therefore, the Congress, Convention and Show in Cleveland next April will be a Demonstration of the Foundry Industry's Contribution to, and support of, our President's pledges of "COMPLETE VICTORY."

For information about Convention and Exhibit address

American Foundrymen's Association
222 W. Adams Street • Chicago

FOUNDRY and ALLIED INDUSTRIES SHOW — *Cleveland,* APRIL 20 - 24, 1942

Steel Streamlining To Fill War Requirements

Schedules revamped as character of demand shifts. Auto graveyard scrap will be moved. Semifinished supply is difficult problem

MARKET IN TABLOID ★

Demand
Heavy programs developing.

Prices
Further ceilings imposed.

Production
Unchanged at 97 per cent.

■ STEELMAKERS are streamlining their efforts to increase efficiency in supplying material for war purposes. Rolling schedules are being revised to conform to the radically changed demand resulting from the shift from peacetime to war needs.

Emphasis now is on different products than in normal times and mills must furnish larger tonnage of some while others in heavy demand in former years now are in secondary position. Mills also are revising their order books and many contracts for non-war consumers are being taken off and returned to customers, as there is no probability of their being filled for many months, if at all. Increasing volume of high-priority tonnage is crowding mill books, making difficult the task of scheduling for most efficient delivery. To untangle this situation broader allocations are expected, probably covering all major steel products and perhaps extending to those less important.

Plates continue most in demand and mills have heavy backlogs, nearly all in highest priority brackets. This is in spite of diversion of continuous mills to production of light plates. Less relief than expected by sheetmakers has resulted from curtailment of automobile manufacture, reduction in demand for that purpose being more than balanced by loss of continuous mill output. Bar demand bids fair to become almost the equal of that in plates as shell programs develop, expected to involve a tonnage that will tax bar mills to the limit.

Scrap from automobile graveyards seems about to move into channels of consumption as the Bureau of Industrial Conservation takes over from the Iron and Steel Branch, WPB. A plan has been formulated to allow owners of these yards to prepare the scrap and sell it wherever they please, after salvaging such parts as are saleable. In case they do not co-operate the bureau has authority to seize the scrap, sell it to the highest bidder and pay the owner on that basis. In many cases promises of immediate co-operation have been received and considerable material should be available within a short time. A large scrap dealer in the Middle West has a corps of workers experienced in cutting up scrap, ready to lend their services to any yard without facilities. One purpose is to forestall such lack as an excuse.

Scrap supply continues much below furnace requirements but seems to have reached a fairly steady flow, keeping steel production relatively even, though numerous steelmaking units continue idle because of scarcity. Numerous state and municipal campaigns to bring out dormant supplies are having some effect but the total is not large. A drive to collect farm scrap is under way and is expected to yield well.

Some difficulty is being met in supply of semifinished steel, non-integrated mills being unable to obtain as much as they need and integrated mills sometimes having allocation orders for shipment to others to an extent that limits their own finished steel production. Additionally lend-lease tonnage continues to take toll of the total supply. Pipe and wire production have suffered most from scarcity of semifinished, especially the latter. One effect of this situation is that mills are seeking larger war tonnages with highest priorities, to assure them of preference in their own semifinished or to assure allocation from others.

Gradually spreading its price control, Office of Price Administration has asked fluorspar producers to hold prices at the level prevailing Jan. 2. The door is left open for increase after showing of figures substantiating claim that higher prices should be allowed.

Steel ingot production last week remained steady at 97 per cent, four districts making small increases, two lost ground and six were unchanged. Chicago rose 1 point to 103 per cent in spite of scrap shortage. Wheeling gained 7 points to 95 per cent, St. Louis 2 points to 78 and Youngstown 1 point to 87. Cincinnati lost 2 points to 84 and Detroit 5 points to 87. Rates were unchanged at Pittsburgh, 95; eastern Pennsylvania, 90; Buffalo, 79½; Birmingham, 90; New England, 95; Cleveland, 94½ per cent.

Automobile production last week was 73,305 units, compared with 79,930 the preceding week, a decline of 7625 cars. In the comparable week last year 124,400 were assembled.

Price composites, limited by ceilings, continue unchanged. The finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Jan. 31	Jan. 24	Jan. 17	One Month Ago Dec., 1941	Three Months Ago Oct., 1941	One Year Ago Jan., 1941	Five Years Ago Jan., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$55.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.20
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	22.80	19.96
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	21.00	18.45

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Jan. 31, 1942	Dec. 1941	Oct. 1941	Jan. 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.17
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Jan. 31, 1942	Dec. 1941	Oct. 1941	Jan. 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$22.15
Heavy melt. steel, No. 2, E. Pa.	17.75	17.87	17.75	19.31
Heavy melting steel, Chicago	18.75	18.75	18.75	20.15
Rails for rolling, Chicago	22.25	22.25	22.25	24.40
No. 1 cast, Chicago	20.00	21.33	21.50	19.35

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.50
Connellsville, foundry, ovens	7.25	7.25	7.25	6.00
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. mill, carloads.

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.

Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.

Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.

Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr.	3.20c	3.95c	3.30c
Armat.	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	...	*18.00	19.00	...	...
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	...	...
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box 5.00
Granite City 5.10

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.05c

Long Ternes

Pittsburgh, Gary No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box 4.30
Granite City 4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 2.10c
Gulf ports 2.45c
Pacific Coast ports 2.65c

Steel Floor Plates

Pittsburgh 3.35c
Chicago 3.35c
Gulf ports 3.70c
Pacific Coast ports 4.00c

Structural Shapes

Pittsburgh, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy S.A.E.	Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20
4100 .15-25 Mo.			0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni.			1.20
5100 80-1.10 Cr.			0.45
5100 Spr. flats			0.15
6100 Bars			1.20
6100 Spr. flats			0.85
Carb., Van.			0.85
9200 Spr. flats			0.15
9200 Spr. rounds, squares			0.40
T 1300, Mn, mean 1.51-2.00			0.10

Do., carbon under 0.20 max. 0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar.... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples... 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column)... 59
Galv. barbed wire, 80-rod spools, base column... 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts.-Cleve.-Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire.. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, base, 35 lbs. and over 28.00-30.00
Light rails, billet qual., Pitts., Chicago, Bham. $40.00
Do., rerolling quality. 39.00

Cents per pound

Angle bars, billet, mills.. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c
Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller.....68 off
Headless, ¼-in., larger..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo.... 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞-inch and under.....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$3.50 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	....	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

In.	Steel Blk.	Steel Galv.
½	63½	51
¾	66½	55
1—3	68½	57½
	Iron	
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

	Steel	
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½

	Iron	
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

	Steel
1 to 3, butt weld	68½
2, lap weld	63
2½ to 3, lap weld	66
3½ to 6, lap weld	65
7 and 8, lap weld	64

Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham.. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to $\frac{47}{64}$-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 *tons of one size, open hearth*

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 15.00c
Toluol, two degree 28.00c
Solvent naphtha 27.00c
Industrial xylol 27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums) 12.50c
Do less than car lots.. 13.25c
Do tank cars 11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 8.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $29.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	. . .	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	. . .	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	. . .
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	. . .	. . .	. . .
Sharpsville, Pa.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	. . .	24.50	. . .
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	. . . .	25.11	. . .
Boston from Birmingham†	25.12	. . .	. . .	. . .
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	. . .	. . .
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	. . .	. . .	. . .
Cincinnati from Hamilton, O.	24.44	25.11	24.61	. . .
Cincinnati from Birmingham†	24.06	. . . .	23.06	. . .
Cleveland from Birmingham†	24.12	. . .	23.12	. . .
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	. . .
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	. . .	. . .
Newark, N. J., from Birmingham†	26.15	. . .	. . . .	. . .
Newark, N. J., from Bethlehem	26.53	27.03	. . .	. . .
Philadelphia from Birmingham†	25.46	. . . .	24.96	. . . .
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	. . .

Pittsburgh dist.: Add to Neville Island base. North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	. . . . .
St. Louis from Birmingham	†24.50	. . . .	23.62	. . . .
St. Paul from Duluth	26.63	26.63	. . . . .	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silverics, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty pd., seab'd $120.00
Carlots, del. Pittsburgh 125.33
Carlots, f.o.b. So. f'ces. 140.00
Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb. 5.50c
Packed 5.75c
Ton lots 6.00c
Less-ton lots 6.25c
Less 200-lb. lots 6.50c
Spot ¼c higher.

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25
Less-ton lots 2.30
(Spot 10c higher)

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome)
Carloads 13.00c
Ton lots 13.75c
Less-ton lots 14.00c
Less than 200-lb. lots 14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Ferrophosphorus, .17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos.
Contract $58.50
Spot 62.25
23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos.
Contract 75.00
Spot 80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50
Packed 80.50
Ton lots 84.50
Less-ton lots, per lb. 4.00c
Less 200-lb. lots 4.25c
Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

	1½%	2½%
Carbon		
Carloads (contract)	$128.00	$118.00
Ton Lots (contract)	140.50	130.50

Freight allowed spot $5 above contract

Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.60-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots $1.23
Less ton lots 1.25
20-25%, C. 0.10 max., in ton lots per lb. contained Ti 1.35
Less-ton lots 1.40
(Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium,

	6-8% C	3-5% C
Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis	$142.50	$157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90
(Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts $1.10
Do., spot 1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50
Packed 107.50
Ton lots 108.00
Less ton lots 112.50
Spot $5 a ton higher
35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Less Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

As Kansas City, Mo., Chattanooga, Tenn., Tulsa, Okla., and Portland, Oreg., were not named in the order fixing ceiling prices they have been omitted below.

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.30	....	5.25	....	6.90	....	....
Seattle	4.35	4.35	....	4.35	4.35	6.10	4.35	6.35	5.60	....	5.75	....	....
Los Angeles	4.50	5.00	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.60	10.55	9.55
San Francisco	4.10	4.60	6.35	4.25	4.25	5.95	4.25	6.40	6.00	....	6.80	10.80	9.80

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.75	9.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.60	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£ s d
Merchant bars, 3-inch and over	$66.50	16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20 0 0
Structural shapes	2.95c	15 10 0
Ship plates	2.90c	16 2 6
Boiler plates	3.17c	17 12 6
Sheets, black, 24 gage	4.00c	22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1 10 9

† British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£ s d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6 8 0(a)
Basic pig iron	24.28	6 0 6(a)
Furnace coke, f.o.t. ovens	7.40	1 16 9
Billets, basic soft, 100-ton lots and over	49.37	12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17 12 0††
Shapes	2.77c	15 8 0††
Ship plates	2.91c	16 3 0††
Boiler plates	3.06c	17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26 2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23 15 0
Bands and strips, hot-rolled	3.30c	18 7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69% ord.	7.50c
Low phos. (.02 max.) F.O.B. Rio Janeiro	8.00c
Scheelite, imp.	23.50-24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk)	
No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian	
2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
Do. concentrate, 48%	33.00
Philippine	
No ratio lump, 45%	32.00
2.8:1 lump, 48%	40.00
Do., concentrate, 48%	39.00
2.5:1 concentrate, 48%	36.50
No ratio concentrate	34.00
No ratio lump, 48%	35.00
Rhodesian	nominal

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

(Gross Tons)

OTHER THAN RAILROAD GRADES	*Pittsburgh	Johnstown, Pa. Sharon, Canton, O.	Steubenville	Youngstown	Warren	Weirton	Cleveland	Cincinnati	Middletown	Portsmouth	Ashland, Ky.	Buffalo	Claymont, Del.	Coatesville	Conshohocken, Pa.	Harrisburg	Phoenixville, Pa.
Open Hearth	20.00	20.00	20.00	20.00	20.00	20.00	19.50	19.50	19.50	19.50	19.50	19.25	18.75	18.75	18.75	18.75	18.75
Machine Shop Turnings	16.00	16.00	16.00	16.00	16.00	16.00	15.50	15.50	15.50	15.50	15.50	15.25	14.75	14.75	14.75	14.75	14.75
Blast Furnace	16.00	16.00	16.00	16.00	16.00	16.00	15.50	15.50	15.50	15.50	15.50	15.25	14.75	14.75	14.75	14.75	14.75
Elec. furnace and foundry																	
Low phos billet, bloom, forge crops	25.00	25.00	25.00	25.00	25.00	25.00	24.50	24.50	24.50	24.50	24.50	24.25	23.75	23.75	23.75	23.75	23.75
Low phos bar crops and smaller	22.50	22.50	22.50	22.50	22.50	22.50	22.00	22.00	22.00	22.00	22.00	21.75	21.25	21.25	21.25	21.25	21.25
Low phos punchings and plate scrap	22.50	22.50	22.50	22.50	22.50	22.50	22.00	22.00	22.00	22.00	22.00	21.75	21.25	21.25	21.25	21.25	21.25
Heavy cut structural, plate, 3 feet, under	21.00	21.00	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.50	20.25	19.75	19.75	19.75	19.75	19.75
Heavy cut structural, plate, 2 feet, under	21.50	21.50	21.50	21.50	21.50	21.50	21.00	21.00	21.00	21.00	21.00	20.75	20.25	20.25	20.25	20.25	20.25
Heavy cut structural, plate, 1 foot, under	22.00	22.00	22.00	22.00	22.00	22.00	21.50	21.50	21.50	21.50	21.50	21.25	20.75	20.75	20.75	20.75	20.75
Cut automotive steel scrap, 3 feet, under	20.00	20.00	20.00	20.00	20.00	20.00	19.50	19.50	19.50	19.50	19.50	19.25	18.75	18.75	18.75	18.75	18.75
Cut automotive steel scrap, 2 feet, under	20.00	20.00	20.50	20.50	20.50	20.50	20.00	20.00	20.00	20.00	20.00	19.75	19.25	19.25	19.25	19.25	19.25
Cut automotive steel scrap, 1 foot, under	21.00	21.00	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.50	20.20	19.75	19.75	19.75	19.75	19.75
Alloy free low phos, sulphur turnings	18.00	18.00	18.00	18.00	18.00	18.00	17.50	17.50	17.50	17.50	17.50	17.25	16.75	16.75	16.75	16.75	16.75
First cut heavy axle and forge turnings	19.50	19.50	19.50	19.50	19.50	19.50	19.00	19.00	19.00	19.00	19.00	18.75	18.25	18.25	18.25	18.25	18.25
Electric furnace bundles	21.00	21.00	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.50	20.25	19.75	19.75	19.75	19.75	19.75

	Sparrows Point, Md.	Chicago	Bethlehem	Kokomo	Duluth	Detroit	Toledo	St. Louis	Atlanta	Alabama City	Birmingham	Los Angeles	Pittsburg, Calif.	San Francisco	Minnequa, Colo.	Seattle	Portland
Open Hearth	18.75	18.75	18.25	18.25	18.00	17.85	.....	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	14.50	.....
Machine Shop Turnings	14.75	14.75	14.25	14.25	14.00	13.85	13.85	13.50	13.00	13.00	13.00	13.00	13.00	13.00	12.50	10.50	.....
Blast Furnace	14.75	14.75	14.25	14.25	14.00	13.85	13.85	13.50	13.00	13.00	13.00	13.00	13.00	13.00	12.50	10.50	.....
Elec. furnace and foundry																	
Low phos billet, bloom, forge crops	23.75	23.75	23.25	23.25	23.00	22.85	.....	22.50	22.00	22.00	22.00	22.00	22.00	22.00	21.50	19.50	.....
Low phos bar crops and smaller	21.25	21.25	20.75	20.75	20.50	20.35	.....	20.00	19.50	19.50	19.50	19.50	19.50	19.50	19.00	17.00	15.50
Low phos punchings and plate scrap	21.25	21.25	20.75	20.75	20.50	20.35	.....	20.00	19.50	19.50	19.50	19.50	19.50	19.50	19.00	17.00	15.50
Heavy cut structural, plate, 3 feet, under	19.75	19.75	19.25	19.25	19.00	18.85	.....	18.50	18.00	18.00	18.00	18.00	18.00	18.00	17.50	15.50	14.00
Heavy cut structural, plate, 2 feet, under	20.25	20.25	19.75	19.75	19.50	19.35	.....	19.00	18.50	18.50	18.50	18.50	18.50	18.50	18.00	16.00	14.50
Heavy cut structural, plate, 1 foot, under	20.75	20.75	20.25	20.25	20.00	19.85	.....	19.50	19.00	19.00	19.00	19.00	19.00	19.00	18.50	16.50	15.00
Cut automotive steel scrap, 3 feet, under	18.75	18.75	18.25	18.25	18.00	17.85	.....	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	14.50	13.00
Cut automotive steel scrap, 2 feet, under	19.25	19.25	18.75	18.75	18.50	18.35	.....	18.00	17.50	17.50	17.50	17.50	17.50	17.50	17.00	15.00	13.50
Cut automotive steel scrap, 1 foot, under	19.75	19.75	19.25	19.25	19.00	18.85	.....	18.50	18.00	18.00	18.00	18.00	18.00	18.00	17.50	15.50	14.00
Alloy free low phos, sulphur turnings	16.75	16.75	16.25	16.25	16.00	15.85	.....	15.50	15.00	15.00	15.00	15.00	15.00	15.00	14.50	12.50	11.00
First cut heavy axle and forge turnings	18.25	18.25	17.75	17.75	17.50	17.35	.....	17.00	16.50	16.50	16.50	16.50	16.50	16.50	16.00	14.00	12.50
Electric furnace bundles	19.75	19.75	19.25	19.25	19.00	18.85	.....	18.50	18.00	18.00	18.00	18.00	18.00	18.00	17.50	15.50	14.00

*Includes Brackenridge, Butler, Monessen, Midland, Pa.

GRADES ORIGINATING FROM RAILROADS	*Pittsburgh	Youngstown	Cincinnati, Cleveland, Middletown, O. Ashland, Ky.	Los Angeles, San Francisco	Birmingham	Buffalo	Chicago	Detroit	Duluth	Kansas City, Mo.	Kokomo, Ind.	Philadelphia	Portsmouth, O.	Seattle, Wash.	Sparrows Pt., Md.	St. Louis	Wilmington, Del.
No. 1 Railroad Heavy Melting	21.00	21.00	20.50	18.00	18.00	20.25	19.75	18.85	19.00	17.00	19.25	19.75	20.50	15.50	19.75	18.50	19.75
Scrap Rails	22.00	22.00	21.50	19.00	19.00	21.25	20.75	19.85	20.00	18.00	20.25	20.75	21.50	16.50	20.75	19.50	20.75
Rails for Rerolling	23.50	23.50	23.00	20.50	20.50	22.75	22.25	21.35	21.50	19.50	21.75	22.25	23.00	18.00	22.25	21.00	22.25
Scrap Rails, 3 ft., under	24.00	24.00	23.50	21.00	21.00	23.25	22.75	21.85	22.00	20.00	22.25	22.75	23.50	18.50	22.75	21.50	22.75
Scrap Rails, 2 ft., under	24.25	24.25	23.75	21.25	21.25	23.50	23.00	22.10	22.25	20.25	22.50	23.00	23.75	18.75	23.00	21.75	23.00
Scrap Rails, 18-in., under	24.50	24.50	24.00	21.50	21.50	23.75	23.25	22.35	22.50	20.50	22.75	23.25	24.00	19.00	23.25	22.00	23.25

*Includes Wheeling, Steubenville, Sharon, Canton.

Maximum Price at Shipping Point. Where the shipment of the scrap to the consumer is wholly or partially by rail, or vessel, or combination of rail and vessel, the scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel for shipment to the consumer.

Where shipment of the scrap to the consumer is solely by motor vehicle, the scrap is at its shipping point when it has been loaded on such vehicle.

The shipping point price for grades 1 of cast iron scrap at the following shipping points in the United States shall be:

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	14.00	15.00	16.00
Heavy Breakable Cast	16.50	17.50	18.50
Charging Box Size Cast	17.25	18.25	19.25

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes all states not named in groups A and B.

Maximum Price Delivered to a Consumer. Scrap is at its point of delivery to a consumer when it has arrived for unloading at the plant of the consumer.

Open Hearth grades refer to No. 1 Heavy Melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers No. 2 bundles and No. 1 busheling.

Blast Furnace grades refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings.

On open hearth grades, blast furnace grades, electric furnace and foundry grades the maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. In no case is any grade deemed by buyer or seller or both to be superior to any grade listed above but sold at a premium above the corresponding listed grade except upon approval by the OPA. No special preparation charges may in any case be added to the prices listed above.

On electric furnace and foundry grades whenever any of these grades is purchased for open hearth or blast furnace consumption the price paid, therefore, may not exceed the price listed herein for the corresponding open hearth grade.

No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage; the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or subbroker, or with the consumer. No commission is payable to a person for scrap which he prepares. No person who has not acted as a broker prior to April 3, 1941 is allowed a brokerage commission.

Sheets, Strip

Sheet & Strip Prices, Page 96

Sheet mills have felt little relief from curtailment of demand from the automotive industry as large continuous mill capacity has been diverted to light plates, more than absorbing tonnage saved from automobile assembly. There is a possibility of tin plate demand being reduced, which may aid in a small way. Currently sheet mills find requirements for war purposes absorb practically all they can turn out at top speed.

In one area January shipments provided about 15 per cent for civilian needs but the outlook for February is that war needs will take the entire production, on high priorities. This situation seems general.

The Navy has just taken bids on two lots of narrow strip, aggregating about 7000 tons. The strip ranges from 1½ to 23½ inches wide, 13 to 18-gage, both hot and cold-rolled. Several thousand tons of barrel stock for 50-gallon drums has been allocated for shipment to a fabricator with plants in various parts of the country. Award of 1600 tons of cold-rolled sheets for 5-gallon gasoline cans, with A-1-j priority, has been made by an eastern fabricator to two producers. A luggage manufacturer is inquiring for 100 tons of specially heavy coated tin plate for kits for the Army Medical Corps, Washington, with a rating of A-1-d.

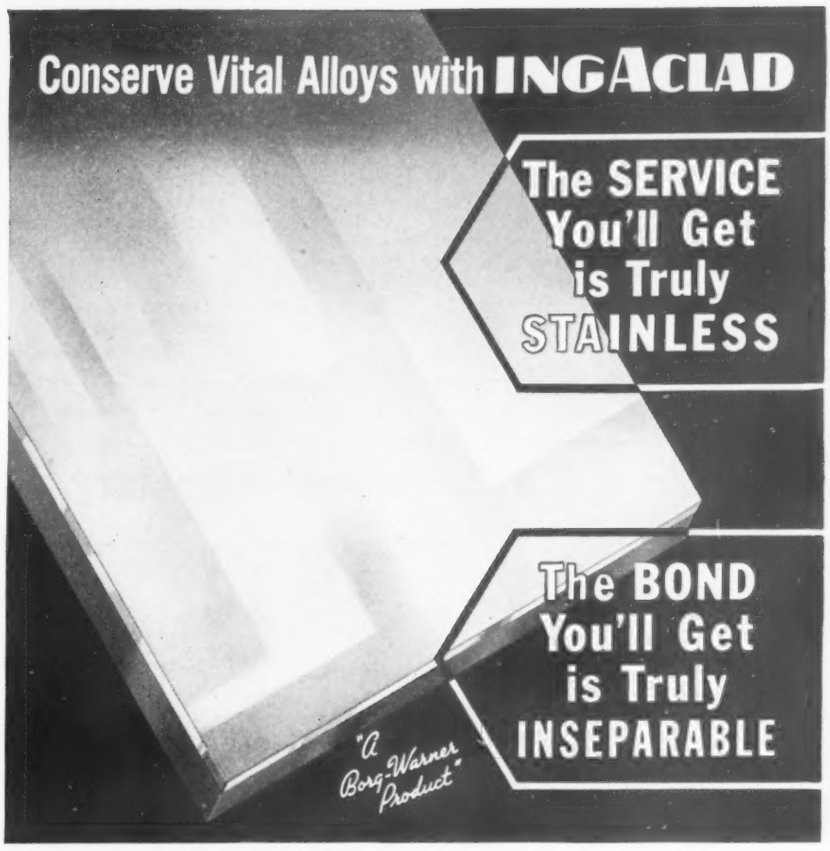
Producers of large stampings are mostly engaged with defense contracts, prime and sublettings, but considerable capacity for production of smaller parts remains open. There is a surplus of this capacity, and, although most shops are seeking work to enable them to obtain steel, disappointments are numerous. Sheets available for construction are limited, notably corrugated galvanized. Small tank fabricators are also pinched for material while industries subjected to curtailment of normal tonnage for civilian goods have only partially filled the gap with defense contracts.

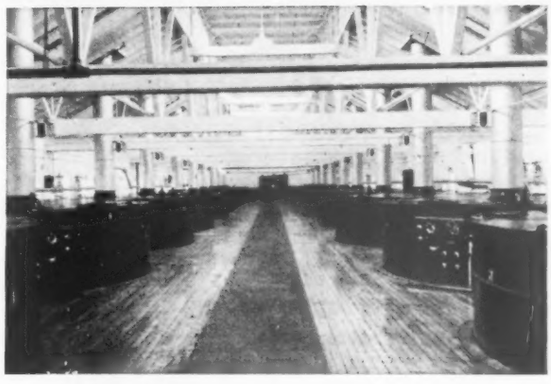
Plates

Plate Prices, Page 96

February plate allocations involve little tonnage below A-1-k and some mills have been given little below A-1-a. Some preferential treatment is being accorded railroads and railroad equipment builders, whose rating of A-3 is relatively low in the plate situation. Supply for these consumers is restricted mainly to universal and strip mill plates of narrower widths than they normally use.

Plate mills probably have the heaviest backlogs of any steelmaking units. They have been practically 100 per cent on war work for months and orders are almost entirely A-1-c or better. It has been difficult to make rolling schedules sufficiently flexible to move rapidly from one size to another. Under allocations there is


Conserve Vital Alloys with INGACLAD
The SERVICE You'll Get is Truly STAINLESS
The BOND You'll Get is Truly INSEPARABLE
"A Borg-Warner Product"



Ten years ago, a leading manufacturer of soaps had this battery of kettles lined with IngAclad. They are in service today, along with many other installations of IngAclad equipment.

10 Years in Actual Use

Prove the Dependability of . . .

INGACLAD

STAINLESS-CLAD STEEL

Today, many manufacturers and fabricators are finding that IngAclad meets every requirement for the stainless service they need, and at much lower cost. They are also finding that if they enjoy a priority rating, they can, in many cases, obtain IngAclad when it would be impossible to secure the solid stainless metal. Installations that have given continuous service for the past 10 years prove you take no chances when you specify or use IngAclad Stainless-Clad Steel.

Write for special IngAclad Folder and Prices.
Fabricators are invited to write for the IngAclad Welding Manual.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
310 South Michigan Avenue • Chicago, Illinois
Plants: Chicago, Ill.; New Castle, Ind.; Kalamazoo, Mich.

a tendency to concentrate orders for a given size of plate to one mill, diverting other sizes to other mills. There also is an effort to design ships, tanks and other war products so as to standardize widths, where possible, to sizes offering most efficient rolling.

Shipbuilding is by far the heaviest consumer of plates and additional shipways have added to the number of craft under construction, increasing the steady demand for deliveries. Deliveries for this purpose have been kept up to schedule in most cases but no inventories have been accumulated beyond a few days supply.

Southern plate mills have a heavy burden to supply Gulf shipyards and important railroad shops, both of which have heavy programs.

Better than 92 per cent of plates being fabricated in New England is by shipyards, most of the remainder by shops supplying ship equipment. Additional contracts will take close to 200,000 tons, mostly plates. Current shipbuilding facilities are at peak, but another 16-way yard, a temporary plant, will be in operation later this year. This expansion in shipbuilding is being increasingly reflected in heavier demands on shops supplying accessories, propulsion gear and miscellaneous requirements.

PLATE CONTRACTS PLACED

690 tons, three tanks, government fuel depot, to Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

175 tons, 500,000-gallon elevated water tank, Roswell Airfield, Roswell, N. Mex., to Darby Products of Steel Plate Corp., Kansas City, Kan., $59,308, bids Jan. 5, pro. 22, United States engineer, Caddoa, Colo.

How to get a first-class refractory job FAST!

ARE YOU trying to speed up a new refractory installation? Or looking for a way to save time and money on upkeep? Then use Refractory Concrete made with LUMNITE—a heat-resistant binder.

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1. A cast-in-place refractory, easily formed to fit any job, however hard to get at or intricate in shape.
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SPECIAL SHAPES of Refractory Concrete can be made in your own plant. You avoid operating delays caused by long waiting for specials. For full information on how to use Refractory Concrete to meet your requirements, write The Atlas LUMNITE Cement Company (United States Steel Corporation Subsidiary), Dept. S, Chrysler Bldg., New York City.

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▶ Factory-prepared LUMNITE Castable Refractories are ready to use without the addition of anything except water. When mixed with water they may be cast in place or molded into precast units in the same manner as all Refractory Concrete.

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LUMNITE FOR REFRACTORY CONCRETE

Bars

Bar Prices, Page 97

Steel bar demand bids fair to become as insistent as that for plates. The variety of products involving bars is large and mill schedules have been loaded with miscellaneous business at high ratings. This caused a program of hot-rolled bar allocations to be undertaken but new and heavier bar demand may make this ineffective before it can be put into operation.

A tremendous new shell program takes precedence over the bar mill's demand for billets and also a large share of bar mill output. A heavy demand for reinforcing bars also has arisen since formal entry into the war.

A recent development is cancellation of some tonnage by agricultural implement manufacturers as they align their programs to 80 per cent of their 1940 production. In 1941 implement output was 120 per cent of that in 1940, the cut for 1942 thus being heavy from the 1941 schedules. These cancellations have enabled mills to advance deliveries on some other business.

Demand for alloy bars is broadening, due largely to subcontracting, notably among machine shops equipped to take on additional precision work. Supplemental purchases of bars are being made by holders of defense prime contracts, some of this tonnage extending beyond second quarter, although there are complaints of over-buying for the immediate future by some direct government agencies. Tool steel demand is maintained at capacity rate, machine shops and cutting tool manufacturers covering well in advance against strong demand, mostly applying against top ratings.

Pipe

Pipe Prices, Page 97

Miscellaneous industrial demand dominates activity in the merchant pipe market. This is substantially heavier than a year ago. Requirements for new apartments and office construction are negligible, although offset in part by increasing demands for renovating work. Public utilities are specifying against maintenance contracts in a more or less normal fashion at present. No important line pipe work is being figured.

Demand for mechanical and boiler tubing continues more active, although deliveries are said to be much better than a few months ago, due to expanding facilities. Boiler tube specifications from ship yards and locomotive repair shops are especially brisk.

Cast pipe foundries have fairly

heavy bookings and are producing the best rate allowed by their pig iron supplies. Government work supplies most of this, municipal buying being light.

CAST PIPE PLACED

200 tons, 20-inch, Panama schedule 5862, to American Cast Iron Pipe Co., Birmingham, Ala.; fittings to Florence Foundry & Machine Co., Florence, N. J.

CAST PIPE PENDING

525 tons, 20 and 24-inch, New London, Conn.

480 tons, defense housing projects at Seattle and Poulsbo, Wash.; bids in.

475 tons, 24-inch, Cranston, R. I.

275 tons, East Eightieth street and Thirty-sixth avenue west improvements, Seattle; 12-inch and accessories; bids Feb. 5.

115 tons, 24-inch cast iron pipe for sewer system, Bremerton, Wash.; bids Jan. 28.

Wire

Wire Prices, Page 97

Demand for wire and wire products continues heavy and mills are well loaded, experiencing some difficulty in operating at full schedule because of short supply of wire rods in many instances. Country demand for nails and fencing is beginning to appear and distributors have small stocks to meet it.

The leading producer of barbed wire has reduced styles of barbed wire from 12 to six in the interest of simplification. This will reduce the quantity distributors are compelled to carry to meet all demands.

Rails, Cars

Track Material Prices, Page 97

Locomotive buying continues, several contracts being placed last week, with a number still on inquiry. Trend toward diesel-electric units continues, especially for switchers.

Freight car buying is light at the moment, although builders are making excellent deliveries in line with the large number promised by May 1. Special efforts are being made to supply steel to car shops and car production is at a better rate than late last year.

CAR ORDERS PLACED

Atlantic Coast Line, 2000 cars; 1100 fifty-ton auto box to Pullman-Standard Car Mfg. Co., Chicago; 400 fifty-ton hoppers, 300 fifty-ton high side gondolas and 100 seventy-ton covered phosphate cars to Bethlehem Steel Co., Bethlehem, Pa.; 100 flat cars to Greenville Car Co., Greenville, Pa.

Chicago & North Western, 500 fifty-ton box cars, to American Car & Foundry Co., New York; 500 gondolas to Bethlehem Steel Co., 500 gondolas to General American Transportation Co.

CAR ORDERS PENDING

Argentine State Railways, fifty 9500-gallon tank cars, bids asked.

Baltimore & Ohio, 2000 cars, reported to be half box and half hoppers; bids asked.

Southern, 2500 hoppers and 1000 gondolas; bids asked.

LOCOMOTIVES PLACED

Republic Steel Corp., Cleveland, two small diesel-electric switchers to General Electric Co., Schenectady, N. Y., and six diesel-mechanical switchers to Fate-Root-Heath Co., Plymouth, O.

St. Louis Southwestern, three 1000-horsepower diesel-electric, to Baldwin Locomotive Works, Eddystone, Pa.

Sanderson & Porter, two 45-ton diesel-electric switch engines, to the General Electric Co., Schenectady, N. Y

Stone & Webster Co., one 80-ton diesel-electric switch engine, to General Electric Co., Schenectady, N. Y.

LOCOMOTIVES PENDING

New York Central, 25 type 4-8-2 steam locomotives; bids asked.

Southern, two diesel-electric freight engines; bids asked.

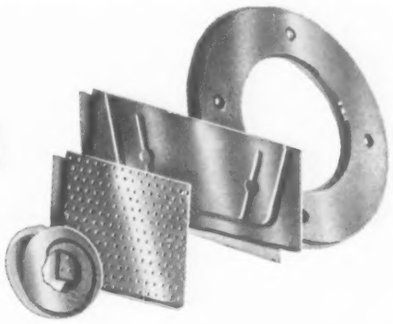
Structural Shapes

Structural Shape Prices, Page 97

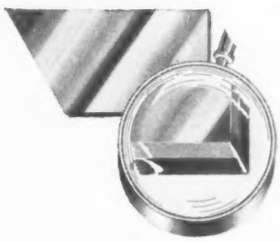
Demand for structural shapes is increasing, after a period of quiet during which mills were able to make some headway against large backlogs. A number of war plant projects have come out and others are almost ready for bids. Private construction is out of the picture as war needs cover entire output.

American Institute of Steel Construction reports orders for fabricated structural steel in December were 146,379 net tons and shipments 176,126 tons. Shipments have exceeded bookings ever since August. Total contracts closed during 1941 totaled 2,296,954 tons, compared with 1,748,144 tons in 1940 and a ten-year average of 1,347,343 tons. Fabricating backlog scheduled for shipment to May 1 contains 626,026 tons, indicating that the industry will maintain its

Pre-Cast Bearing Bronze on Steel PATENTED



New Bearing Metal Adapted to Many Other Uses



PERMANENT BOND

Examine a section of *Pre-Cast Bearing* BRONZE ON STEEL closely and see how permanently the bronze is bonded to the steel.

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the complete story on *Pre-Cast Bearing* BRONZE ON STEEL . . . it's FREE

While *Pre-Cast Bearing* BRONZE ON STEEL was developed primarily for sleeve bushings and bearings, it also fills many other important industrial uses. It is ideal for applications requiring a flat bearing surface such as plates, washers, etc. In applications where the movement is slow or where lubrication is uncertain, it is often advisable to use the graphited bronze type.

Some manufacturers prefer to secure *Pre-Cast Bearing* BRONZE ON STEEL in rolls and do their own stamping and forming. In such cases, we can furnish it in coils up to 400 feet in length. The maximum width of the strip is 5½ inches.

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

550 S. MILL STREET • NEW CASTLE, PA.

present production rate during that period.

SHAPE CONTRACTS PLACED

2700 tons, plant building, Vickers Co., Detroit, to Joseph T. Ryerson & Son Inc., Chicago; Turner Construction Co., New York, contractor.

2000 tons, power plant, American Gas & Electric Corp., Brilliant, O., to Bethlehem Steel Co., Bethlehem, Pa.

1500 tons, munitions plant, to Bethlehem Steel Co., Bethlehem, Pa.

1500 tons or more, six hydraulic hoists for penstock coaster gates, to Willamette Iron & Steel Co., Portland, Oreg.

1000 tons or more, for ships, to Willamette Iron & Steel Co., Portland, Oreg.

690 tons, piling, diversion channel flood gates, Brazos river, Galveston, Tex., for United States engineers, to Inland Steel Co., Chicago; Telepson Construction Co., Houston, Tex., contractor; bids Nov. 25.

640 tons, gas plant, Henderson, Ky., to Virginia Bridge & Iron Co., Roanoke, Va.; Semet-Solvay Engineering Co., contractor.

600 tons, factory addition, to Leach Bros., Rochester, N. Y.

385 tons, building for General Motors Corp., to Hudson Structural Steel Co., Newark, N. J.

370 tons, additions to forge shop and machine shop, Taylor Forge & Pipe Works, Chicago, to Joseph T. Ryerson & Sons Inc., Chicago.

350 tons, Willow road repair over Chicago, Milwaukee, St. Paul & Pacific railroad, Northfield, Ill., for Cook county, to American Bridge Co., Pittsburgh.

190 tons, staging towers, shipbuilding plant, to American Bridge Co., Pittsburgh.

130 tons, alterations, Long Island railroad section, Pennsylvania station, New York, to Jones & Laughlin Steel Corp., through George A. Fuller Co., New York.

100 tons or more, two 150-ton gantry cranes, to Dravo Corp., Pittsburgh, at $1,980,000; specification 10522, Bureau of Yards and Docks, Navy Department, Washington.

SHAPE AWARDS COMPARED

	Tons
Week ended Jan. 31	13,055
Week ended Jan. 24	19,808
Week ended Jan. 17	17,718
This week, 1941	24,081
Weekly average, 1942	21,786
Weekly average, 1941	27,373
Weekly average, Dec. 1941	17,619
Total, 1941	200,691
Total, 1942	87,143

Includes awards of 100 tons or more.

SHAPE CONTRACTS PENDING

6000 tons, shipyard extensions; Walter Kidde Constructors Inc., New York, contractor.

5000 tons, bearing piles, naval depot.

3500 tons, two army warehouses and shed; James I. Barnes, Santa Monica, Calif., contractor; bids Jan. 23.

3300 tons, navy yard improvements; bids Jan. 28.

3000 tons, munitions plant; Frazer-Brace Engineering Co., Wilmington, Del., engineer.

2000 tons, additions to aeronautical plant.

900 tons, addition to Sisters Hospital, Buffalo.

600 tons, shop, Bethlehem-Lebanon Forge Co., Lebanon, Pa.

500 tons, automotive plant addition.

500 tons, storehouse, Tietjen-Lang Dry Dock Co., Hoboken, N. J.

500 tons, estimated, addition, American Locomotive Co., Auburn, N. Y.

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Reinforcing Bars

Reinforcing Bar Prices, Page 97

Reinforcing bar bookings are increasing rapidly and delivery promises are further deferred in spite of increased capacity and orders carrying A-1-a rating are receiving March 1 or later promise. Some current inquiry probably will be withdrawn. Road and bridge tonnage is appearing as a seasonal development. Monthly average production during last half, 1941, was about 175,000 tons and now is close to 200,000 tons.

Current inquiries are fairly

CONCRETE BARS COMPARED

	Tons
Week ended Jan. 31	13,891
Week ended Jan. 24	9,727
Week ended Jan. 17	12,259
This week, 1941	6,976
Weekly average, 1942	11,394
Weekly average, 1941	13,609
Weekly average, Dec., 1941	7,362
Total, 1941	45,953
Total, 1942	45,575

Includes awards of 100 tons or more

evenly divided into direct and indirect defense, but only the most urgent, with highest ratings, are being accepted. A recent emergency job requiring 5000 tons was placed within 24 hours and rolling started within 48 hours.

REINFORCING STEEL AWARDS

7400 tons, powerhouse at hydroelectric dam, to unstated interest, by Bureau of Reclamation.

5000 tons, defense projects, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, defense projects, to Northwest Steel Rolling Mills, Seattle.

500 tons, hospital, Springfield Memorial Hospital Association, Springfield, Ill., to Bethlehem Steel Co., Bethlehem, Pa., John Femley Co., Bloomington, Ill., contractor; bids Jan. 12.

213 tons, Bureau of Reclamation Invt. B-44045-A, Earp, Calif., to Republic Steel Corp., Cleveland.

173 tons, airport facilities, to Sheffield Steel Corp., Kansas City, Mo.; Koss Construction Co., Des Moines, Iowa, contractor.

105 tons, three pumping stations and appurtenant works, Huntington, W. Va., to West Virginia Rail Co., Huntington; Edward A. McCarthy & Son, Cincinnati, contractors.

REINFORCING STEEL PENDING

250 tons, structures for navy yard; bids Jan. 28.

100 tons, buildings for naval station; Wick & Dahlgren, Seattle, contractors, low at $219,471.

Unstated tonnage, 228,550 square feet expanded metal for Navy; schedule 9835, delivery to western yards; U. S. Gypsum Co., Chicago, low at 2.80c, delivered, or 8.46c, f. o. b.

Pig Iron

Pig Iron Prices, Page 98

Pig iron allocations to melters with B priorities have been tapering in recent months and this tendency is expected to continue unless they obtain contracts for war work with a higher preference. Indications are that in a short time these lower priority melters may be cut off almost entirely. Some consumers whose product has been reduced by government order who have not obtained war work are operating at reduced rate and asking less iron than formerly.

In areas where machine tool production is an important factor demand for castings has grown rapidly and pig iron requirements are correspondingly heavy. Much of this is being filled from the smaller requirements of manufacturers of non-war goods.

Pig iron shipments to the Pacific Coast, now all-rail since coastwise vessels have been commandeered by the government, will bear a heavy freight charge. From Chicago and Duluth to California points the rate is $11.44 per ton, and from Birmingham, Ala., $13.70 per ton.

Scrap

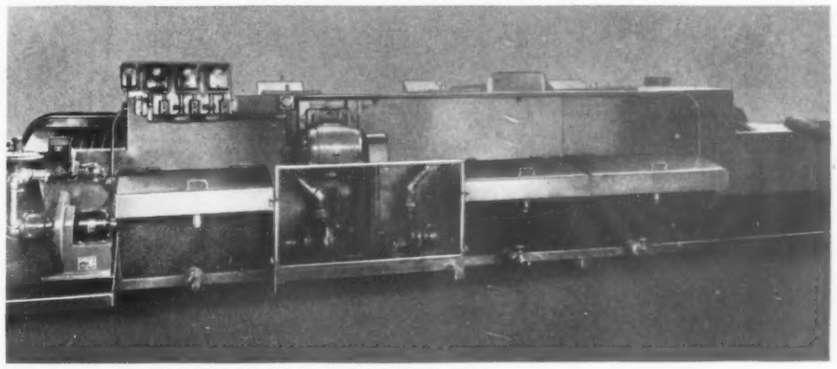
Scrap Prices, Page 100

More than 3,000,000 tons of scrap is expected to be obtained from automobile graveyards during next 30 to 90 days, under a campaign started by the Bureau of Industrial Conservation, which has taken over scrap collection from the Iron and Steel Branch of WPB. Lessing G. Rosenwald is in charge.

Field agents will request owners to proceed immediately to cut up cars and sell the scrap to dealers of their own choosing, with permission to remove saleable parts and to retain and recondition cars capable of being repaired. In cases where owners refuse co-operation the government will take possession, ask bids on the entire stock and reimburse the owner on the basis of the bid. The successful bidder will prepare and market the scrap. Agreements already are being obtained from owners of many graveyards.

The bureau is also organizing a drive to gather scrap from farms, circularizing farmers to ascertain where scrap is available, trucks then gathering it and the farmer being paid the market price at once. The plan is being tried out in a few localities and results will be a guide to its application generally. Several states have issued rules requiring old automobile license plates to be surrendered when new ones are issued. This will provide several hundred tons of steel in each state.

In general scrap tonnage is coming out at a steady rate, consider-



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ably below requirements but showing little fluctuation. Occasional allocations are being resorted to but distribution is fairly equable in most consuming areas. At Chicago last week supplies were sufficiently better to bring an advance of 1 point in steel production. In the St. Louis district scrap flow has improved and one steelmaker has been able to add one open hearth. Buffalo mills are holding their production rates but only by using a larger proportion of pig iron, scrap supply being much below requirements.

While no general allocation program is being undertaken instances of scrap tonnage being ordered to definite consumers are on the increase. Electric furnace scrap, especially, is being handled in this way, though the tonnage is not large.

To forestall any excuse on the part of automobile graveyard owners that they did not have facilities for preparing their material an Ohio dealer has a corps of experienced men ready to take over the job wherever needed in his territory.

Pacific Coast

Seattle — The Bonneville Power Administration announces important expansion of J. D. Ross substation, at Vancouver, Wash., $1,994,000 allotted for the current year, $2,400,000 for 1943. The 1942 program also includes $457,000 for warehouse, storage and office buildings. The Grand Coulee east powerhouse, now under construction by Consolidated Builders Inc., will be 743 x 84 feet, 200 feet high, all concrete, to house nine 108,000-kw. generators.

Commandeering of the 39 remaining freighters in the intercoastal trade means stoppage of intercoastal water service, of much concern to steel companies, which in normal times received most of their supplies by this route. This means throwing an additional load upon the already overburdened land carriers and increased difficulty in obtaining supplies from eastern mills.

The scrap situation is tighter, local mills losing inventory during the month but still having sufficient stocks for immediate needs. Receipts are ebbing, dealers claiming they cannot prepare No. 1 at the present level of $14.50 a gross ton. The California ceiling has been raised to $17 and handlers in this area are holding back, hoping for a parity price.

Jobbing interests state OPA ruling that less carload shipments must be sold at stock prices is causing them to go into the red and restricting efforts to assist in the national program. Due to difficulty in obtaining replacements, carload shipments are few and established price ceilings are unsatisfactory both to warehouses and customers.

Canada

Toronto, Ont.—With demand for finished and semifinished steel expanding under the enlarged war program, the Canadian government is calling more extensively on domestic producers as well as on the United States to meet requirements. Consumers now are permitted to place orders direct with mills, which are submitted to the steel controller for approval. Where it is impossible for Canadian mills to make deliveries in sufficient tonnage or at dates required, arrangements are made with United States producers to provide the required steel. As far as most lines of finished steel are concerned Canadian mills now are booked almost solid to the end of June, but for more urgent war orders deliveries are made ahead of those that can be deferred. Practically no orders are being accepted for purely civilian production and these consumers are unable to obtain deliveries. A few wire mill products are available but otherwise all steel output is going direct to war industry. Announcement was made during the week that the Federal Government has provided a subsidy to Canadian Furnace Co., Port Colborne, Ont.,

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up to $350,000, to be used in the purchase of coke from the United States for blast furnace requirements, for the purpose of enabling this company, which does not operate coke ovens, to obtain coke at a price which will enable it to maintain production of pig iron without advancing prices. The subsidy, it is understood, will take care of the 11 per cent rate on foreign exchange.

Shipbuilding operations are being speeded and orders for plates are heavy. However, most buying is being done in the United States to meet more pressing demands, as all Canada's output is going direct into this type of work. It also was announced during the week that orders for several thousand tons of sheets were placed with domestic mills for shipbuilding. With the exception of war orders practically no sales of sheets are reported and mills are fully booked for six months.

Inquiries continue for merchant bars, but outside war consumers, mills are not filling orders.

With the exception of plant additions comparatively little construction work involving use of steel is underway or proposed. Structural steel awards continue around 2000 tons weekly, although several contracts are pending which will involve a total of about 15,000 tons.

Pig iron demand absorbs all available supply and despite increased production of foundry and malleable grades, sufficient iron is not available to fill demand. Shortage of cast scrap is creating an acute situation for foundries, and pig iron is not sufficient to enable operations for any long period at current rates.

Heavy and growing demand with steadily declining supply are the dominating features of the iron and steel scrap markets. While there has been no curtailment in steelmaking as a result of scrap shortage, the supply is steadily dropping and when mill inventories have been depleted new sources of raw materials will have to be found, and it is with this object in view that substantial increase in pig iron production is planned.

Warehouse

Warehouse Prices, Page 99

Warehouse steel sales in January were reduced in most cases, especially in dollar volume. Limited shipments from mills under the quota system continue to keep stocks low and assortments broken. Complaint is still heard of difficulties under regulations imposed when prices were frozen.

The new allocation program for cold-drawn bars, which is in effect this week, may not have full effect in February but the outlook for later months is not good. Replacements require increasingly higher priority ratings, which adds to difficulties in obtaining mill tonnage.

Cold-Finished Steel

Cold Finished Prices, Page 97

Cold-finished bar producers believe the forthcoming allocation designed to supply them hot-rolled bars may not give them expected relief. This conclusion is based on the size of the shell program which will be well under way by second quarter and is expected to cover entire production of bar mills at times. Shell steel will take precedence over the proposed allocations.

On the other hand, a fairly large proportion of shells are of cold-finished steel and lend-lease exports call for cold-finished. Automotive demand has been the principle source of demand for cold-finished bars and with this out of the way cold-finishing mills will not need as much raw material as usual.

Until ordnance demand develops its full force cold mills may receive sufficient hot-rolled material to make progress against orders now on books and reduce whatever backlogs they have accumulated.

Metallurgical Coke

Coke Prices, Page 97

Formal price ceilings on beehive oven furnace coke produced in Pennsylvania, setting a maximum figure of $6 per net ton f.o.b. car

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ovens, Connellsville region, on and after Jan. 26, were announced last week by OPA in Schedule No. 77.

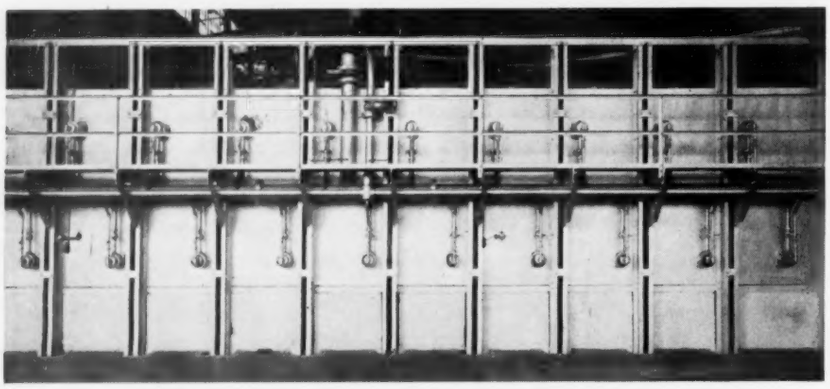
Action was taken by OPA to avert any unwarranted increase in beehive oven furnace coke prices. Pennsylvania produces approximately 88 per cent of the country's total beehive coke output.

Prices of Pennsylvania beehive coke rose about 80 cents per ton, or 15 per cent, between January and October, 1941, the schedule points out. Since Oct. 1, 1941, beehive coke prices have been approximately $6 per ton f.o.b. car ovens, Connellsville, Pa. On Dec. 15, OPA sent telegrams to 55 beehive coke producers responsible for virtually all the Pennsylvania output, requesting that the $6 price be maintained. This $6 figure was the generally prevailing market price at that time.

OPA has had a formal price ceiling on by-product furnace coke, effective Oct. 1, 1941. With by-product furnace coke prices under ceiling regulations, consumer bidding is being diverted to beehive furnace coke, thereby creating buoyancy in beehive furnace coke prices.

The war effort has stimulated beehive coke output from a low of 837,000 tons in 1938 to 6,700,000 tons in 1941, an 800 per cent increase. The enlarged 1941 steel production could not have been achieved without bringing into production the beehive ovens located principally in Pennsylvania.

The price schedule declares that the maximum price on beehive coke shall be $6 per net ton f.o.b. car ovens Connellsville region, Pa., plus the transportation charges from Connellsville to the place of delivery as customarily computed.



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Steel in Europe

Foreign Steel Prices, Page 99

London—(*By Cable*)—All iron and steel producers in Great Britain are active and many works are booked to the end of the quarter. Domestic iron ore and coke supplies are plentiful and pig iron is sufficient, except hematite. Production of special steels is approaching a new record. Tin plate mills are well booked and manufacturers of plain and galvanized sheets are busy on government contracts.

Heavy Forging Shops Scheduled into 1944

Producers of heavy forgings are booking orders for 1944 delivery and are booked solid for two years. This industry felt defense pressure among the earliest and has been pushed to capacity since 1939. Much new equipment is on order and its output also is covered for many months. There are few plants making heavy forgings, one of the largest being a government facility. Equipment consists of presses from 3500 tons to 14,000 tons capacity.

Heavy shafts for power equipment, hydroelectric installations and heavy armor plate make up a large part of forged products. Capacity is being greatly expanded, in one case the increase since 1939 being 500 per cent.

Long-range planning is an important factor in present heavy bookings. Projects requiring heavy forgings require many months to complete and the forging shop can schedule its output a year in advance and be ready with its contribution at the date the project is ready to use it.

Fluorspar

Fluorspar Prices, Page 98

Fluorspar producers have been asked by OPM not to advance prices above the level quoted Jan. 2, 1942. It is requested that notice of intention to quote higher prices be given a month before effective date of the proposed change, accompanied by reasons for the advance. Certificates of co-operation have been sent to all producers for signatures.

An advance from $23 to $25 was made in December to cover higher costs of production.

Chilean Iron Ore Cargo Sunk by Submarine

Sinking of the ore carrier VENORE by a submarine off North Carolina Jan. 24, sent 23,000 tons of Chilean iron ore to the bottom of the Atlantic. She had left Baltimore Jan. 16 and loaded a cargo at Cruz Grande, Chile. The ship was owned by the Ore Steamship Corp., 25 Broadway, New York. She was built at Sparrows Point, Md., in 1921 and was an oil tanker for several years. She was valued at $2,250,000 when built.

Semifinished Steel

Semifinished Prices, Page 97

Tightness in semifinished steel supply is reflected in curtailed pipe and wire production. Pipe mills depending on integrated mills for skelp are unable to obtain full supply as skelp is a plate mill product and must take its chance with the high-rated plate tonnage for war use. Wiremakers are much hampered by inability to obtain wire rods or billets.

Mills with a high proportion of war work are in better position as to semifinished supply, either by allocation from some other producer or ability to retain more of their own semifinished. Numerous instances have occurred where allocation of semifinished to mills having more important orders has limited output of finished steel by the semifinished producer.

Tin Plate

Tin Plate Prices, Page 96

Tin plate production continues at practical capacity and for most part shipments are confined to top priority. In spite of reported action to reduce use of tin for cans buying of tin plate has shown no decline. Mills are making shipments as rapidly as possible to decrease backlogs before the full impact of demand for canning gets under way.

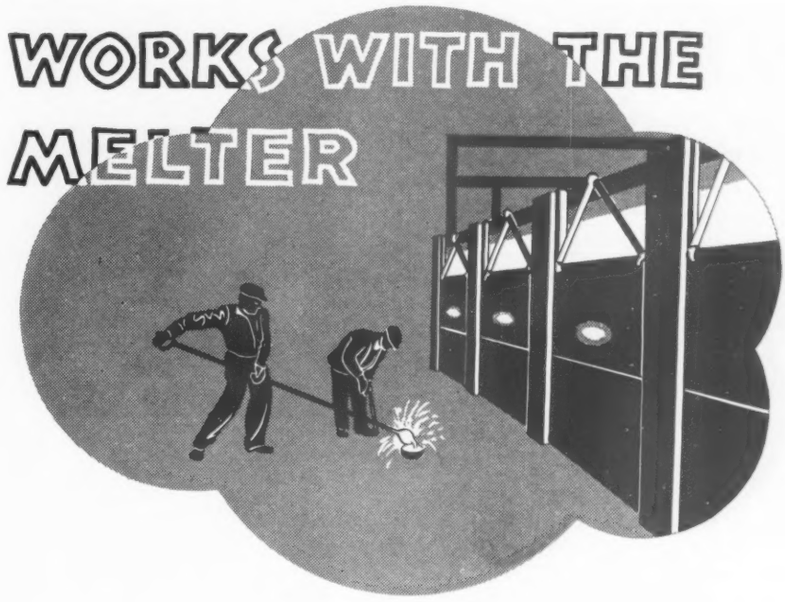
Equipment

Seattle—Active buying by defense and governmental agencies features this market, electric and automotive equipment leading. Bonneville Power Administration, Portland, Oreg., embarked on an extensive expansion program, has numerous bid calls out, including: Jan. 30, seven lightning arresters, No. 2538; construction of control house Oregon City; Feb. 2, nine current reactors, No. 2541; Feb. 3, 49.6-mile, 115-kv. wood pole Pendleton-LaGrande power line, No. 2547; copper cable and wire, No. 2531; conductor and ground wire hardware, No. 2552; Feb. 7, switchgear, No. 2543; Feb. 9, voltage regulators, No. 2551; Feb. 12, three transformers, No. 2548; Feb. 20, 65,000 feet of copper wire, No. 2553, Leeds & Northrup Co., Philadelphia, is low at $10,945, to United States engineer for furnishing recorders for Bonneville power house. Bids are in at Puget Sound navy yard for three 4-wheeled trailers and bids are asked Feb. 4 for 28,500 feet of copper tubing, No. 3629; Feb. 5, for 36,700 feet copper tubing, No. 3628; Feb. 6 for 13,500 feet of steel tubing, No. 3627.

Higher Export Price on Steel May Be Allowed

Iron and steel exporters are encouraged over indications from Washington that they will be permitted to sell abroad at a differential above the domestic ceiling. They will not get as much of a differential as they are seeking, but it appears that established merchant exporters will be given sufficient leeway to enable them to do business at at least a moderate profit.

In normal times the usual commission allowed by steel mills was 2½ per cent. With producers deluged with tonnage this commission practically disappeared months ago, with producers generally quoting on an f.o.b. mill basis and exporters having to assume all costs and responsibility from there on. This imposed a substantial increase in the exporters' expense of doing business, an increase that had been passed on to buyers until the re-



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cent OPA ruling went into effect Dec. 15, placing a ceiling on export prices at the same level as domestic.

As a result, export business, other than lease-lend, dried up rapidly and the extent to which this suspension has amounted is reflected, interestingly, by the zeal with which steamship companies in the South American trade are now soliciting cargoes, apparently having considerable space available. In these times this is decidedly unusual.

How much of a differential will be permitted established merchant exporters has not been definitely indicated. Exporters generally have asked for a differential of 10 per cent, some even higher, but it appears likely that it will be less, although probably, according to the trade here, above the 2½ per cent, which ruled in normal times.

Meanwhile, an increasingly heavy tonnage is being placed under lease-lend, with shipments scheduled for many parts of the world, to points strategic for the Allies. A large tonnage of sheets for Russia has recently been placed under lease-lend, according to reports from Washington. Incidentally, a definite policy with respect to exporting to South America through government financing is expected to be announced shortly.

Nonferrous Scrap Price Rules Not Clarified

New York—General dissatisfaction with the meeting Thursday at which Washington officials of OPA explained the aluminum, copper, nickel and lead scrap price schedules was expressed by members of the trade. It was pointed out that these officials presumably make the decisions on how to interpret price rulings, yet they did not get across to the trade clear answers to many specific questions.

Buyers and sellers who asked for interpretation of rules were invited to come to Washington for a ruling. Since the trade considered the results so unsatisfactory they indicate it will be difficult to assemble another such representative meeting.

Many suggested that a written question and answer interpretation of various price schedules be compiled and distributed to the trade. These questions should be those most commonly asked.

War Production Board priority rules and Office of Price Administration price rules operate together, as far as the trade sees, yet OPA officials declined to discuss relation of price and priorities rules.

Slab Zinc Ceiling Set By OPA on Formal Basis

Washington — OPA has established formal price ceilings on primary slab zinc under price schedule 81, immediately, on the basis of 8.25c per pound f.o.b. East St. Louis, for prime western, the same as the informal ceiling operative since October. The action is explained to be due to some dealer sales exceeding informal agreement. Sales of primary slab zinc in excess of quotas to Metals Reserve Co. are exempted from the ceiling and will be made in accordance with the premium price arrangements. Quantity differentials follow those in the primary lead order. Grades of primary slab zinc conform to A.S.T.M. specifications, those not meeting such standards to be sold at normal differentials below the established maximums, except for tailor-made products.

Base prices follow for the respective grades: Prime western 8.25c; selected 8.35c; brass special 8.50c; intermediate 8.75c; high grade 9.25c; special high grade 9.25c; in carloads first four base price plus carload freight, East St. Louis to buyer's receiving point; last two at base price; less than carloads, first four grades 20,000 pounds and less than carload base plus 15 cents; 10,000 and less than 20,000 base plus 23 cents; 2000 and less than 10,000 base plus 40 cents; less than 2000, base plus 50 cents; all plus carload freight upon

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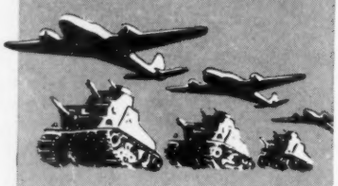

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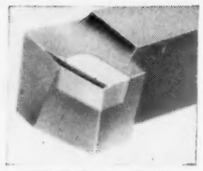

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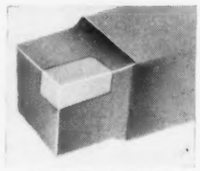

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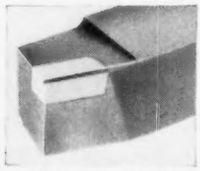

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SALES REPRESENTATIVES FROM COAST TO COAST

McKENNA METALS Co.
200 LLOYD AVENUE, LATROBE, PENNA.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
(Exclusive of Canada and Great Britain)

Canadian Agent: Kennametal Tools & Mfg. Co., Ltd., Hamilton, Ont.

Nonferrous Metal Prices

Jan.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-12	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00
13-30	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.12½-10.25
Cleveland	10.25-10.50
Chicago	9.50-10.00
St. Louis	10.25

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.37½-9.75

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.25
Chicago	6.50-7.00
St. Louis	6.50

Lead

New York	5.25-5.60
Cleveland	5.40-5.50
Chicago	5.25-5.60
St. Louis	5.25-5.35

Old Zinc

New York	5.00-5.25
Cleveland	5.25-5.50
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l	13.25
Standard No. 12 aluminum	14.50

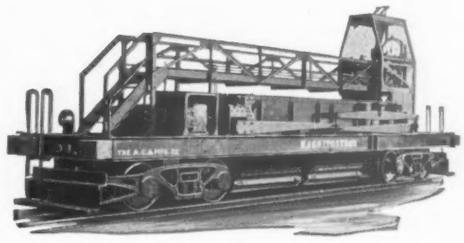
East St. Louis to the point of shipment; on high grade and special high grade for respective quantities base plus 15 cents; 25 cents; 40 and 50 cents. Above applies to sales by producers; on sales except by producers sales in similar respective lots, 20,000 down to 2000 pounds for first four grades, base plus 65 cents; plus 75 cents; plus $1; plus $1.50; all plus carload freight East St. Louis to the point of shipment. The same price additions to base price are made on high grade and special high grade.

Nonferrous Metals

New York—Many important orders were issued by government agencies last week including Price Schedule 81, establishing ceiling prices on zinc; L-28, restricting production of incandescent lamps; M-1-e, restricting use of aluminum; M-78, conserving mercury for war purposes; M-9-c-1, restricting use of copper in the manufacture of shoe eyelets. Emphasis continues to be put on the production of all metals and the conservation of present supplies for essential needs.

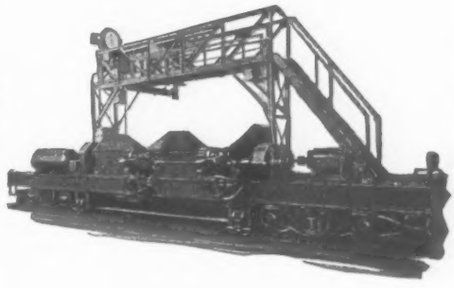
Copper—Due to censorship, quotas for companies seeking to bene-

ATLAS SCALE CARS



20 Ton — Double Compartment Scale Car. Journals provided with self aligning anti-friction bearings. Equipped with Atlas Indicator and Recorder.

20 Ton Two Compartment Scale Car with Orr Bin Gate Operating Mechanism. Anti-friction bearings. Equipped with Atlas Indicating and Recording Mechanism.



Other Atlas Products

Gas-Electric and Diesel-Electric Locomotives—Car Pushers—Storage Battery Locomotives—Electrically Operated Industrial Cars—Scale Cars and Weighing Cars of all kinds — Ore Transfer Cars and Blast Furnace Charging Cars.

Coke Oven Equipment

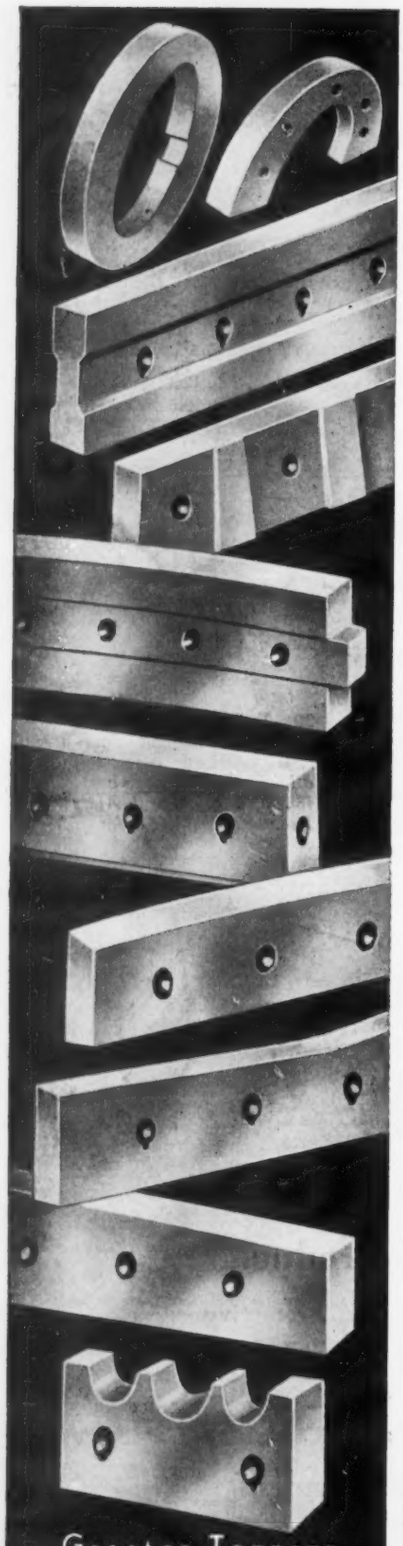
Pushers and Levellers—Coal Charging Cars—Door Handling Machines — Coke Quenching Cars.

Also Atlas Patented Indicating and Recording Mechanism for Weighing Scales.

THE ATLAS CAR & MFG. CO.

Engineers . . . Manufacturers

CLEVELAND, OHIO



fit from the premium price provisions of the government's agreement will not be announced publicly. Pooling of resources of the United Nations will require a stricter control over copper in all forms. Maximum brass and bronze ingot prices, as issued Jan. 2, become effective Feb. 1.

Lead — Refined stocks increased 46 per cent in December but showed a drop of 51 per cent for the full 1941 year. WPB's pool is likely to require 15 per cent of producers' output in February, unchanged from the previous two months.

Zinc—The government has taken from 5 to 33 per cent of monthly production, depending upon the grade. Maximum prices were set on the basis of 8.25c, f.o.b. East St. Louis, for prime western.

Tin—Capacity of the Defense Plant Corp.'s smelter at Texas City, Tex., is expected to be raised to 50,000 tons per year.

Ryerson Marks Century Of Service in Steel

■ Joseph T. Ryerson & Son Inc., steel warehouse, observes the 100th anniversary of its steel service to American industry by issuing a 268-page steel stock list. In addition to full listing of more than 11,000 items of steel normally carried in stock for immediate shipment the publication contains a brief history of the organization from a small iron store in 1842 to a group of ten large large plants in major industrial areas.

The list is available to buyers, engineers and all who work with or have a hand in selection or specification of steel products, from any of the company's offices.

Low on Brass Bars

Titan Metal Mfg. Co., Bellefonte, Pa., is low on 900,000 pounds of rolled naval brass bars for delivery at Newport, R. I., at $154,244.82, schedule 9826, Navy Department.

Universal Engineering Co. Ltd., Los Angeles, voluntarily has withdrawn a request made to OPA for a 15 per cent price increase on its well bits.

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

For each 1% tungsten contained

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

WATER
FOR A NATION AT WAR!

To the East and to the West, we are looking straight into the cannons of war. From within we face the inevitable saboteur. It is time to become grim, cautious and determined in our war aims and actions. We must win this war and do a good job of it. We will fight with men, metals, fuel, power, food, water and materials of all kinds.

Never before has water been a more vital necessity. Beyond its task of serving men, materials and machines, water now also must guard against fire . . . protect factories, equipment, supplies, homes . . . and lives.

As in the strenuous days of defense preparation, Layne now is ready, fully equipped and speedily engaged in an even greater task . . . that of providing water for a Nation at war. This activity includes service to the Military and Naval forces, essential industries and necessary repair work.

Check your water supply and install necessary wells and pumps. See that all present wells and mechanical equipment are placed in good order and kept ready for any emergency. Repairs to existing equipment will conserve material needed for war purposes.

LAYNE & BOWLER, INC.
Memphis, Tenn.

LAYNE
PUMPS & WELL
WATER SYSTEMS
Affiliated Companies

Layne-Arkansas Company	Stuttgart, Ark.
Layne-Atlantic Company	Norfolk, Va.
Layne-Central Co.	Memphis, Tenn.
Layne-Northern Company	Mishawaka, Ind.
Layne-Louisiana Company	Lake Charles, La.
Layne-New York Co.	New York City.
Layne-Northwest Company	Milwaukee, Wis.
Layne-Ohio Company	Columbus, Ohio
Layne-Texas Company	Houston, Texas.
Layne-Western Company	Kansas City, Mo.
Layne-Western Co. of Minn.	Minneapolis, Minn.
Layne-Bowler New England Corp.	Boston, Mass.
International Water Supply, Ltd.	London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

Bethlehem Organizes Plant Air Raid System

■ A complete air-raid precaution organization, operating 24 hours a day, seven days a week, has been set up for the plants and properties of Bethlehem Steel Co., affecting almost 200,000 employes. The procedure includes wardens, patrol systems, fire-fighting squads, bomb extinguishers, medical and first-aid crews, safety and maintenance organizations.

The company has issued in booklet form "Procedure for Air-Raid Protection," which outlines the major necessary precautions to be taken. For example, the minimum equipment for an auxiliary fire-fighting squad is indicated as follows:

One pair of leather or asbestos gauntlets for each squad member.

One pair of dark safety-glass goggles for each squad member.

Four water buckets.

One sand bucket with 3-inch or 4-inch layer of sand in bottom for use in removal of incendiary bombs.

One portable water pump.

One long handled, flat, square-nosed shovel.

Two bags, each containing about 10 pounds of sand.

Two electric lanterns.

Two one-pound sealed packages of copper sulphate to be dissolved in water (1 pound of copper sulphate per bucket) for use on phosphorous bombs.

One hundred feet of ½-inch manila rope.

Three steel sheets for protective shields.

Named Price Executive for OPA Iron, Steel Section

WASHINGTON

■ Clair Wilcox, Swarthmore college economics professor and consultant to the National Resources Planning Board, has been appointed price executive in the OPA Iron and Steel Section.

Roswell Whitman, R. H. Macy & Co., New York, former price executive for the section, has been named director of policy planning for steel prices.

Increase in Price of Borax, Boric Acid Authorized

Advances in price of $1 a ton on borax and $2 a ton on boric acid, justified by increased production costs, have been authorized by OPA.

Increase was permitted only after a 30 days' suspension of the advanced price by the American Potash & Chemical Corp., Trona, Calif., at the request of OPA, which refused permission until after its investigation had been made.

Other producers of borax and boric acid are: Pacific Coast Borax Co., Los Angeles; West End Chemical Co., Oakland, Calif.; Pacific Alkali Co., Los Angeles; Stauffer Chemical Co., San Francisco.

Large quantities of borax and boric acid are utilized for household use. About 30 per cent of the output is used as a flux in the iron enameling trade and another 30 per cent goes into the glass industry for similar purposes. The remainder is used in tanning, soap powders and other uses.

28,000 Farm Implement Dealers Asked To Hold Retail Prices

OPA last week telegraphed 28,000 dealers in farm machinery requesting them to maintain prices on tractors and other implements at levels not higher than the retail prices suggested by manufacturers, plus actual freight handling costs and sales taxes.

Appalachian Area Gas Wells Started by Dec. 23 To Be Completed

Natural gas wells in Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia which had actually been started before Dec. 23 may be completed, notwithstanding the original provisions of Conservation Order M-68.

Because of increased war production in the Appalachian area, a larger supply of natural gas is immediately needed, and the amendment to Order M-68 will permit completion of about 160 natural gas wells which could not have been constructed under the original terms of the order, which allowed completion only of wells which had actually been "spudded" before Dec. 23.

Lead Products Price Schedules Modified

Price schedules for metallic lead products and lead alloys has been modified to permit producers to charge either the prices prevailing Jan. 2, 1942, or those prevailing April 1, 1941, plus 65 cents per pound lead content.

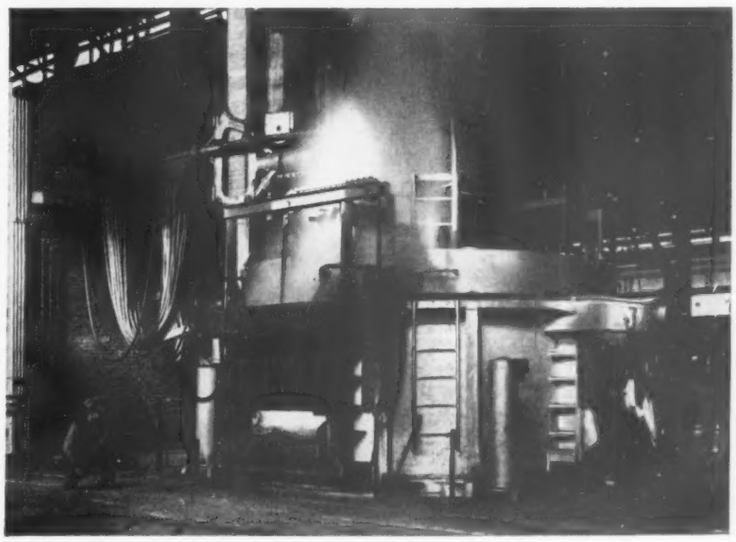
Titanium Dioxide Pool Requirements Increased

Percentage of titanium dioxide which must be set aside by producers for direct allocation by the Division of Industry Operations was increased from 20 to 25 per cent by Amendment No. 3 to General Preference Order M-44.

Titanium dioxide is used in paint and other protective coatings.

Amendment No. 3 to the titanium dioxide order became effective Feb. 1.

88 *Lectromelts* SOLD IN 1941



ANOTHER 75 TON LECTROMELT ON ALLOY STEEL

LECTROMELT furnaces are built in sizes ranging from 100 tons to 25 pounds. Both door charge and top charge types are available. Rugged and durable construction. Rapid and economic operation.

PITTSBURGH LECTROMELT FURNACE CORP.

PITTSBURGH, PA.

G. A. WELDING *Shop Notes*

"BODY STRENGTH" OPENINGS

A pressure vessel can be no stronger than its openings. In G. A. "Fluid-Fusion" Welded Vessels every opening is strongly reinforced. Contour and location are studied for the most efficient design. Only the finest grades of necks and fittings are used. The welding is so skillfully done that it assures extra strength at these important points — manways and nozzles *as strong as the body itself.*

G. A. "Fluid-Fusion" Welded Vessels are made exclusively by:

PLATE AND WELDING DIVISION

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PLATE & WELDING DIVISION

PLANT AT SHARON, PA.

Cable Address GENTANWELD Sharon, Pa.

Offices In All Principal Cities

Census Bureau To Make Metal Survey for WPB

WASHINGTON

■ War Production Board has started a statistical study to determine what shapes and forms of metals are going into production, and quantities of each for needed minimum civilian uses. Questionnaires have been sent to 10,000 manufacturers and users of critical and scarce materials. Returns must be filed with the census bureau by Feb. 20. The bureau is conducting the inquiry on behalf of the board.

The form to be used in filing the returns is PD 275, an adaptation from PD 25-a, used in connection with the production requirements plan. Information called for includes total quantity of materials put into production during the last quarter of 1941; total inventory on types and sizes on hand Dec. 31, 1941; total quantity of materials to be used for production during April, May and June 1942, with details of the physical structure of the products, such as character of materials entering into them and end-use; farm equipment, railroad materials and other articles for military use.

W. A. Hauck To Make New Survey on West Coast

W. A. Hauck, chief of plant expansion unit, WPB Iron and Steel Branch, will visit West Coast to make a survey of the general steel situation there.

Mr. Hauck made a similar trip last May, following which he submitted recommendations for expanding the steel industry on the West Coast which were subsequently adopted.

Various projects continue to be submitted for increasing steel capacity, with particular emphasis on finishing facilities. While these proposals have not yet been acted upon it is generally believed they will be soon, in which case the 10,000,000-ton ingot expansion program probably will be increased.

Simplify Barbed Wire To Save Inventory

■ To conserve materials and simplify products, American Steel & Wire Co., Cleveland, has revised its galvanized barbed wire types. All two-point barbed wire is to have uniform spacing of four inches between barbs and all four-point barbed wire spacing of five inches. After present stocks are sold there will be no differentiation between "hog" and "cattle" wire and only one spacing in each brand or style will be available.

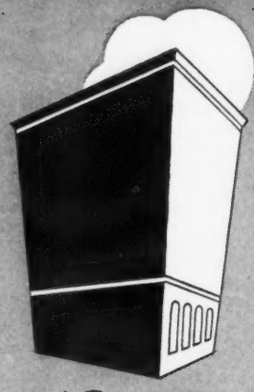
CONSTRUCTION and ENTERPRISE

Ohio

ALLIANCE, O.—Babcock & Wilcox Co., 339 Rush street, has completed plans for two extensions of 63,600 and 29,680 square feet, respectively.

ALLIANCE, O.—Alliance Mfg. Co., Lake Park boulevard, is installing machinery for manufacture of small arms.

CANTON, O.—Canton Drop Forging & Mfg. Co., 207 Twelfth street, Southeast, A. C. Brauchler, president and general manager, is having plans prepared for



Public preference

is won through ability to place comfortable accommodations at your disposal . . . serviced to your satisfaction . . . priced to fit your requirements . . . so that you'll "tell the folks back home."

DETROIT LELAND HOTEL

800 OUTSIDE ROOMS ALL WITH PRIVATE BATH . . . SINGLE FROM $2.75 . . . DOUBLE FROM $4.50

CHARLES H. LOTT
General Manager

$4,500,000 airplane cylinder head and crankcase factory, 500 x 600 feet.

CLEVELAND—McKinney Tool & Mfg. Co., 1688 Arabella avenue, will soon start addition to machine shop and office at 17211 Olympia road, comprising 14,000 square feet. E. W. McKinney is president.

CLEVELAND—Eaton Mfg. Co., C. I. Ochs, president, 755 East 140th street, is adding 51,000 square feet to plant at 14200 Darley avenue.

CLEVELAND—Cleveland Electric Illuminating Co., Public square, will spend approximately $16,000,000 at its Cleveland and Avon, O., plants. Included in the program are two 132,000-volt switching stations, two 132,000-volt transmission lines, seven distributing substations, 60,000-kilowatt generator at Avon Lake.

CLEVELAND—J & L Machine & Tool Co., recently organized, will take over former Slagor Machine & Tool Co. plant at 6106 Ackley avenue. Details will be released later according to Frank J. Kus, attorney with Quigley & Byrnes, 308 Euclid avenue.

CLEVELAND—Cleveland Steel Products Corp., 7306 Madison avenue, Arthur S. Singler, secretary, is again considering factory at West 117th street and Carbon road. Project was postponed last fall.

CLEVELAND—Draper Mfg. Co., H. W. Lees, president and treasurer, will add 1170 square feet to steel drum and barrel factory at East Ninety-first street and Crane avenue.

CLEVELAND — Cleveland Automatic Machine Co., Arthur L. Patrick, executive vice president and treasurer, will add 1400 square feet to plant at 2269 Ashland avenue.

CLEVELAND—Ohio Crankshaft Co., William C. Dunn, president, 4000 Harvard avenue, is considering erection of another plant to meet demand for parts.

DAYTON, O.—Dayton Mold Co., G. H. Wells, president, 3200 Delphos avenue, has awarded contract for construction of $20,000 addition to its plant to Henry Stock & Son. Equipment will cost about $25,000.

DOVER, O.—Wagner & Sons recently sustained severe damage by fire to their foundry and machine shop.

MANSFIELD, O.—Barnes Mfg. Co., 651 North Main street, has various improvements under way at its factory and office.

NEW PHILADELPHIA, O. — Mount Iron Co. of New York, and connected with Portage Engineering Co., 64 East Cedar street, Akron, O., began operations Feb. 1 at the former plant of American Sheet & Tin Plate Co. Heavy milling machinery will be manufactured.

NEW PHILADELPHIA, O.—Allied Machine & Engineering Corp., Ravenna, O., will open former West End garage building here to expand production of lock nuts for defense industries.

PAINESVILLE, O.—White Machine Tool & Engineering Co., recently organized, will manufacture automatic machine tools in plant at Madison, O., which it will take over and add to. Temporary offices are at 10 West South street, Painesville. Leon White is president.

New Jersey

NEWARK, N. J.—Steel & Alloy Tank Co., 1 Bessemer street, will build tank manufacturing plant. Cost $100,000.

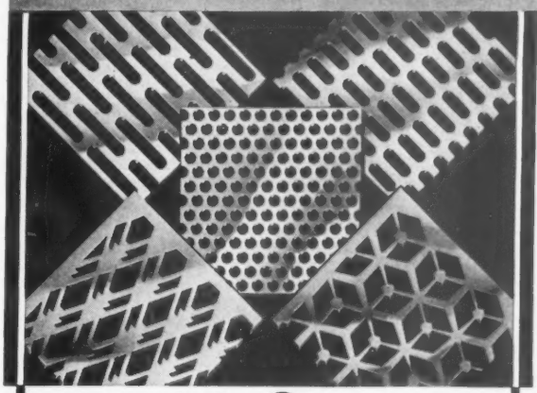
PERTH AMBOY, N. J.—Harris Structural Steel Co., New Market, N. J., will install motors and controls, switchgear, electric crane and hoists in shipyard here. Cost over $300,000.

Pennsylvania

GROVE CITY, PA.—Cooper-Bessemer Corp., Mt. Vernon, O., will erect additions to storage facilities here, for which contracts have been let for $150,000 finished material storage building and $21,000 pattern storage building. Gordon Lefevre is general manager.

ELLWOOD CITY, PA.—Ellwood City borough, L. W. Monroe, city manager,

PERFORATED METALS



Industrial - Ornamental
ANY METAL ANY PERFORATION

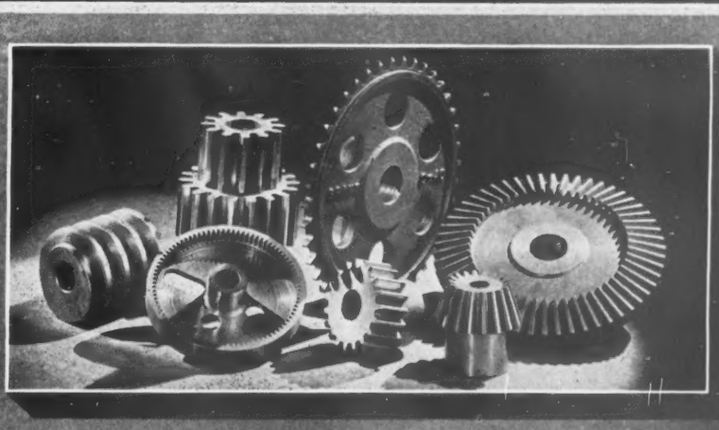
INDUSTRIAL—Whether your screening problems include very coarse or extremely fine materials, you will obtain the best results with perforated metal. H & K screens have increasingly served in all fields of industry for many years and established an unequaled standard in lasting performance. Regardless of size, metal or perforation, permit us to discuss your requirements with you.

ORNAMENTAL—Beauty of ornamental grilles depend largely on the experience of the designer and producer. Experience has built a complete assortment of H&K ornamental grilles that will satisfy your wants in both design and price.

Write us for further information.

The Harrington & King Perforating Co.

5634 FILLMORE ST., CHICAGO 114 LIBERTY ST., NEW YORK



GRANT

GEARS Sizes ¼" to 72"—Spur—Bevels—Mitres—Helicals—Worms & Worm Gears—Sprockets—Reduction Units. Also Special Gears. Over Sixty Years Manufacturing Experience.

GRANT GEAR WORKS — BOSTON, MASS.

plans sewer and sewage disposal plant addition and alterations. Cost $149,000.

Michigan

ANN ARBOR, MICH.—International Industries Inc. will construct a $260,000 addition to its plant, including machinery and equipment.

DEARBORN, MICH. — Clark Instrument Inc., 10200 Ford road, has been incorporated to manufacture measuring instruments. Correspondent: Clyde W. Clark Jr., 5821 Steadman avenue.

DETROIT—Bryant & Detwiler Co., Detroit, has been awarded general contract for steel foundry, 286 x 352 feet, at the Rouge plant of Ford Motor Co., Dearborn, Mich. Giffels & Vallet Inc., Detroit, architects.

DETROIT—Albert A. Albrecht Co., 1204 Penobscot building, has been awarded general contract for alterations to foundry at the Cadillac Motor Division of General Motors Corp., Detroit.

DETROIT—Duplex Tool & Mfg. Co., 940 East Lafayette avenue, has been formed with $10,000 capital to buy and sell machinery and tools. Correspondent: Ferdinand Plateau, 3474 Bewick avenue.

DETROIT—Frank J. Saile Inc., 6666 West Tireman avenue, has been incorporated with $100,000 capital to manufacture tools, dies, etc., by Frank J. Saile, 5991 Yorkshire.

DETROIT—Westfield Mfg. Co., 14381 Westfield avenue, has been organized with $40,000 capital to manufacture defense supplies. Willis S. Anderson, 9624 Abington, correspondent.

DETROIT — Ditchy-Perry-Sidnam, Detroit architects, are preparing plans for an addition to the factory of the Chicago Pneumatic Tool Co. It will be three stories, 50 x 150 feet.

FARMINGTON, MICH.—Precision Tool & Mfg. Co. has plans by Giffels & Vallet Inc., 1000 Marquette building, Detroit, for one and two-story, 103 x 232-foot factory. Cost $110,000.

FERNDALE, MICH.—C. E. Daniel, Grosse Pointe Woods, Mich., will erect a $40,000 factory on Nine Mile road here.

JACKSON, MICH.—Hilfinger Co. Inc., 655 Hupp avenue, has been organized to deal in iron and steel by Robert Hilfinger, 195 South St. Clair street, Toledo, O.

WYANDOTTE, MICH.—Firestone Metal & Rubber Products Co. will build boiler house costing $50,000. Russell Engineering Co., 607 Shelby street, Detroit, engineer.

Illinois

AURORA, ILL.—Western United Gas & Electric Co. has let contract to Charles E. Giertz & Son, 57 Douglas street, Elgin, Ill., for superstructure of addition to its power plant here. Estimated cost $500,000. Sargent & Lundy, 140 South Dearborn street, Chicago, consulting engineers.

BROADVIEW, ILL.—Construction has been begun on factory building for Hub Plating Co., 1233 Fifty-second street, Cicero, Ill. E. Buzovsky, 5314 West Twenty-fifth street, is general contractor. Cost estimated at $50,000.

CHICAGO — Interstate Machinery Co. Inc., 1431 West Pershing road, maker of metal fabricating machinery, has purchased from American Hide & Leather Co. a tract 264 x 408 feet, at Elston avenue and Blackhawk street for future construction of warehouse and manufacturing plant.

CHICAGO—Era Tool & Engineering Co., 316 South Marshfield avenue, will construct factory building at Addison and Kenton avenues, to contain 6250 square feet of floor space. Cost $17,000.

GENESEO, ILL. — Municipal Electric Light & Power Utility is considering expansion in municipal power plant, including installation of new diesel engine generator unit and auxiliary equipment. Cost over $45,000.

KANKAKEE, ILL.—Florence Stove Co., W. L. Cooper, manager, will erect 160 x 350-foot factory. Cost over $40,000.

LIBERTYVILLE, ILL. — Frank G. Hough Co. plans erection of an addition to its factory to cost about $80,000. W. D. Mann, 362 Park avenue, Highland Park, Ill., architect.

MEREDOSIA, ILL. — Central Illinois Public Service Co., Springfield, Ill., will soon begin work on steam-electric generating station here, including installation of turbine generator unit and accessories, high pressure boiler and auxiliary equipment.

PRINCETON, ILL.—Water and Light Department has approved plans for expansion and improvements in municipal power plant, including installation of turbine generator unit and auxiliary equipment. Cost over $55,000.

Indiana

BLOOMFIELD, IND.—Utilities District of Western Indiana Rural Electric Membership Corp., has $370,000 REA allotment for generating plant.

BURNS CITY, IND.—Bureau of Yards and Docks, Navy Department, Washington, plans construction of steam power station here. Estimated cost $85,000, with boiler units and auxiliary equipment.

INDIANAPOLIS—Curtiss-Wright Corp., 30 Rockefeller Plaza, New York, has plans by Albert Kahn & Associates, 345 New Center building, Detroit, for air-

CARTER HOTEL
CLEVELAND'S
CHOICE
AND THE
STEELMAN'S
CHOICE
TOO

Head for the hotel that's headquarters for travelers who appreciate real value! The Carter has 600 outside rooms, all with bath and circulating ice water. Three restaurants are carefully air-conditioned.

RATES
Single from $2.75
Double from $4.00

HOTEL CARTER
Prospect near Ninth
Cleveland
ALLEN JAMES LOWE
President—Managing Director
Affiliated with
American Hotels Corp. of N. Y.
J. LESLIE KINCAID, President

plane manufacturing plant. Estimated cost $2,500,000.

Mississippi

PETAL, MISS.—Forest county, Beat two, R. L. Freeman, supervisor, plans waterworks and sanitary sewer system, for which $110,000 funds are available. R. T. Myers, Hattiesburg, Miss., engineer.

Missouri

ST. LOUIS—Edwin F. Guth Co., 2615 Washington avenue, has awarded contract to Austin Co., 1198 Arcade building, for erection of one-story, 80 x 116-foot addition to factory at 2637 Washington avenue. Cost estimated at $40,000, including equipment.

Wisconsin

NEENAH, WIS.—J. W. Hewitt Machine Co., North Commercial street, will erect one-story addition, 49 x 77 feet, to its plant, for which contract has been awarded to C. R. Meyer & Sons Co., Oshkosh, Wis. Estimated cost $14,800.

Texas

GALVESTON, TEX. — City, Brantly Harris, mayor, has approval of DPWA for construction of sewerage system; federal grant of $81,000 and bonds of $50,000 are available. Ford, Bacon & Davis, New York, engineers.

Iowa

CEDAR RAPIDS, IOWA — Link-Belt Speeder Corp., Cedar Rapids, has plans by M. S. Carstens, 1 North LaSalle street, Chicago, for factory addition costing $75,000.

KEOKUK, IOWA—Keokuk Electric Metals Co. has awarded contract for the substructure of its power house to the Cameron Joyce Co., Keokuk, at $93,550.

MASON CITY, IOWA—Northwestern States Portland Cement Co. plans expenditure of $100,000 in rehabilitation of its plant here.

California

LOS ANGELES—McCullough Tool Co. will erect a factory building at 5818 Alameda street. Cost estimated at $30,000.

Canada

HAMILTON, ONT.—International Harvester Co. of Canada Ltd., Sherman avenue North, will proceed with erection of plant addition to cost about $50,000, with equipment.

HAMILTON, ONT.—National Steel Car Corp., Kenilworth avenue, will proceed with plant addition to cost about $20,000. Two new furnaces and hoisting equipment will be installed at additional cost.

HAMILTON, ONT.—Eagle Smelting & Refining Works, 400 Richmond street West, is calling new bids for construction of plant addition to cost about $25,000. Peter Merson is in charge of operations.

NIAGARA FALLS, ONT.—Lionite Abrasives Ltd., Stamford Township, will build plant addition to cost about $25,000.

RENFREW, ONT.—Renfrew Electric & Refrigerator Co. Ltd. will rebuild plant recently destroyed by fire. General contract awarded to M. J. Sulphur & Son, Lisgar street.

TORONTO, ONT.—City council has given general contract to Rayner Construction Ltd., 29 Commercial street, Leaside, Ont., for construction of initial unit of sewage disposal plant on Fisherman's Island at cost of about $1,662,877. Total cost of project estimated at $5,600,000. Gore & Storrie, engineers, 1130 Bay street, are preparing plans.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd. has let general contract to Hin Construction Co. Ltd. for alterations to heat treating plant to cost about $20,000. J. R. Porter, chief engineer.

ASBESTOS, QUE.—Canadian Johns-Manville Co. Ltd. will build machine shop, 100 x 270 feet. Construction contract given to MacKinnon Steel Corp. Ltd., Industrial street, Sherbrooke, Que., at $35,000. Bids will be called later for mine buildings and other additions to cost about $60,000.

LACHINE, QUE.—Harrington Tool & Die Co. Ltd., 201 First avenue, has given general contract to J. J. Shea & Co., 660 St. Catharine street West, Montreal, for construction of plant addition to cost $35,000.

MONTREAL, QUE.—United Steel Corp. Ltd., 385 St. Martin street, has plans for addition to Farand and Delorme plant to cost $225,000, for which Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, has general contract.

MONTREAL, QUE.—Canada Car Munitions, subsidiary of Canadian Car & Foundry Co. Ltd., 621 Craig street West, has given general contract to Atlas Construction Co., 679 Belmont street, for construction of munitions plant at Cherrier, Que., to cost about $750,000.

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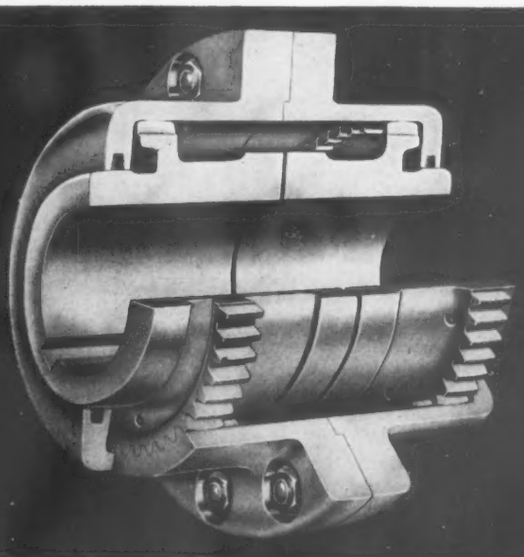

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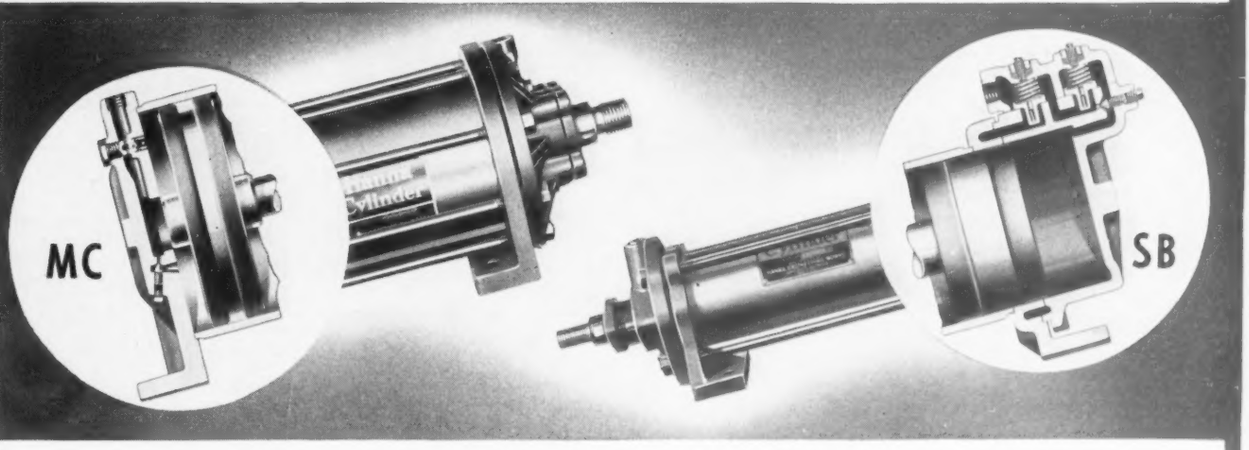

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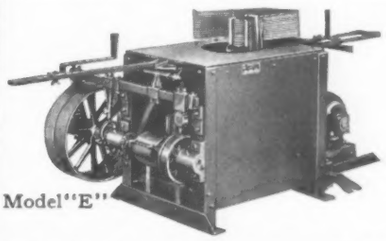
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Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BINS (Storage)
Lyon Metal Products, Inc., 7211 Madison Ave., Aurora, Ill.

BLACKING (Graphite)
United States Graphite Co., The, Saginaw, Mich.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

BLAST FURNACE CLEANING (Gas)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE HOT BLAST STOVES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., First National Bk. Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Reading Chain & Block Co., Dept. D-1, Reading, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

WHERE-TO-BUY

BOLTS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Acid Resisting)
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

BRICK (Chrome)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Ladle)
Globe Brick Co., The, East Liverpool, O.

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silica)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
American Broach & Machine Co., Ann Arbor, Mich.
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.

BRUSHES
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Carbon)
United States Graphite Co., The, Saginaw, Mich.

BRUSHES (Industrial)
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Steelgript)
Fuller Brush Co., The, Hartford, Conn.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

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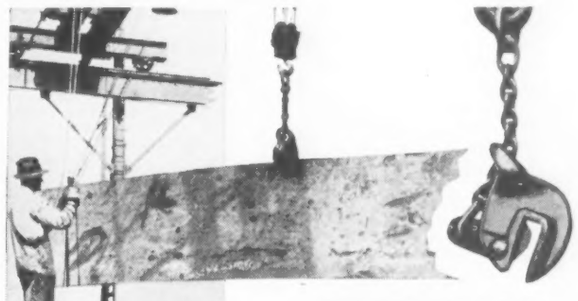

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Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

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Austin Co., The, 16112 Euclid Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Maehler, Paul, Co., The, 2210 Lake St., Chicago, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

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Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

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Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

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Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

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Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CAPSTANS (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CAR DUMPERS
Alliance Machine Co., The, Alliance, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

CARBON SPECIALTIES
United States Graphite Co., The, Saginaw, Mich.

CARBURIZING COMPOUNDS
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

CARBURIZING (Pack or Gas)
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Cinder Pot)
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Easton Car & Construction Co., Easton, Pa.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Differential Steel Car Co., Findlay, O.
Easton Car & Construction Co., Easton, Pa.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Iron)
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro Alloys Co., The, Elyria, O.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Corrosion Resisting)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Brown, Inc., 456 So. Main St., Lima, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Ferracute Machine Co., Bridgeton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango-Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
Electro Alloys Co., The, Elyria, O.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Div. of Baldwin Locomotive Works, The
Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Steel) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehm, Pa.
Birdsboro Stel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.
Quigley Company, 56 W. 45th St., New York City.

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Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.

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Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

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American Chain & Cable Co. Inc., Bridgeport, Conn.

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Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

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CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

CHEMICALS (Industrial)
American Solder & Flux Co., 2153 Z. Norris St., Philadelphia, Pa.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

CHUCKS (Automatic Closing)
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANERS (Steam)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
MacDermid, Inc., Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)
Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

COMPOUNDS (Case Hardening, Heat Treating, Polishing)
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS—See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONSTRUCTION (Industrial Building)
Austin Company, The, 16112 Euclid Ave., Cleveland, O.

CONTACTS & CONTACTORS (Electrical)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYING SYSTEMS (Steam Jet)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.

CONVEYORS (Roller—Power and Gravity)
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORE WASH
United States Graphite Co., The, Saginaw, Mich.

COTTER PINS
American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUNTING DEVICES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, Ohio.
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Alliance Machine Co., The, Alliance, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, Ohio.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.

CRANES (Hand)—Con.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUT-OFF MACHINES (Abrasive)
Challenge Machinery Co., Grand Haven, Mich.
DeSanno, A. P., & Son Inc., Phoenixville, Pa.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Dept. S, Jackson, Mich.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CUTTING-OFF MACHINES (Rotary)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave. McKees Rocks, Pa.

CYANIDING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CYLINDERS (Air or Hydraulic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Scaife Co., Ames St., Oakmont, Pa.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.
Scaife Co., Ames St., Oakmont, Pa.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ames St., Oakmont, Pa.

DEGREASERS
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City.

DESCALING PROCESSES
The Bullard Co., Bridgeport, Conn.

DIAMONDS (Wheel Dressing)
Diamond Tool Co., 938 E. 41st St., Chicago, Ill.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co. 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DOORS & TRIM (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAW BENCHES
Vaughn Machinery Co., Cuyahoga Falls, O.

DRESSERS (Grinding Wheel)
Diamond Tool Co., 938 E. 41st St., Chicago, Ill.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.

DRILLING MACHINES (Vertical)
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Link-Belt Co., 220 S. Belmont Ave Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Machine Tool)
Berkeley Equipment Co., First Avenue, Corry, Pa.

DRIVES (Motor)
Berkeley Equipment Co., First Avenue, Corry, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

DRYERS (Paint, Varnish, Enamel, Chemical)
Maehler, Paul, Co., The, 2210 Lake St., Chicago, Ill.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
American Foundry Equipment Co., The, Mishawaka, Ind.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELECTRODES (Resistance Welding)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Easton Car & Construction Co., Easton, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINEERS (Lubricating Equipment)
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

ENGINES (Diesel)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Kerosene)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FACTORY & INDUSTRIAL BUILDINGS—See BUILDINGS (Industrial)

FANS (Crane Cab)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F. & Son, Inc., Holyoke, Mass

FANS (Exhaust Ventilating)
Graybar Electric Co., 420 Lexington Ave., New York City.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., 1316 Wabansia Ave., Chicago, Ill.

FANS (Portable)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FENCE (Chain Link)
Continental Steel Corp., Kokomo, Ind.
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.

WHERE-TO-BUY

FENCING (Wire)—Con.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America,

FERROTITANIUM
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave.,

FILES AND RASPS
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE EXTINGUISHERS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Kidde, Walter, & Co., Inc., 232 West St., Bloomfield, N. J.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
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Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Robertson, H. H. Co., Farmers Bank Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Co., Sharpsburg, Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
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Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Div. of The Baldwin Locomotive Works, Paschall P. O., Philadelphia, Pa.

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Bethlehem Steel Co., Bethlehem, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FOUNDRY EQUIPMENT
American Foundry Equipment Co., The, Mishawaka, Ind.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Upton Electric Salt Bath Furnace Div. Commerce Pattern Fdry. & Mach. Co., 7452 Melville Ave., at Green, Detroit, Mich.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.

FURNACES (Enameling)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Forging)
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Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
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Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
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Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
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Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

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Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
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Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
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Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
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Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

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Sheffield Corp., The, Gage Div., Dayton, O.

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Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St.
Equipment Steel Products Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Galvanizers Incorporated, Portland, Ore.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Scaife Co., Ames St., Oakmont, Pa.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING COMPOUNDS
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GALVANIZING PLANTS FOR SHEETS
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Wean Engineering Co., Warren, O.

GALVANIZING PRODUCTS
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Bethlehem Steel Co., Bethlehem, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
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Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
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Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
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Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

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Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
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Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.

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Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRAPHITE
United States Graphite Co., The, Saginaw, Mich.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

GREASE FITTINGS
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

GREASE GUNS
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

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GRINDER HEADS
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GRINDERS (Circular Saw)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

GRINDERS (Foundry Core)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING COMPOUNDS
Stuart, D. A., Oil Co., Ltd., 2733 S. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

GRINDING MACHINE ATTACHMENTS
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Die)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Gear)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc. Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Mesta Machine Co., P. O. Box 1466. Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Segmental)
Norton Company, Worcester, Mass.

GRINDING MACHINES (Spline)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

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Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
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Bay State Abrasive Products Co. Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
DeSanno, A. P., & Son Inc., Phoenixville, Pa.
Macklin Co., The, Jackson, Mich.
Norton Co., Worcester, Mass.
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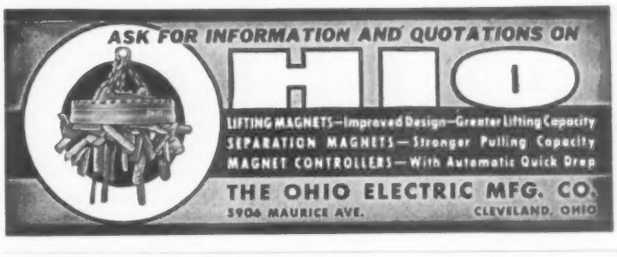
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Morgan Engineering Co., The, Alliance, O.

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Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
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SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

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Fafnir Bearing Co., New Britain, Conn.
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New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

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Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

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Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
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Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. D-1, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Corp., 1345 E. Milwaukee Ave., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE REINFORCEMENT MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 175 Duke St., York, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Racine Tool & Machine Co., Racine, Wis.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INGOT MOLD WASH (Graphite)
United States Graphite Co., The, Saginaw, Mich.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INSTRUMENTS (Electric-Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

INSULATING BRICK
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg. New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

INSULATION (Building)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LADLES
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LAPPING PLATES
Challenge Machinery Co., Grand Haven, Mich.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Axelson Manufacturing Co., 6160 So. Boyle Ave., Los Angeles, Cal.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
Morey Machinery Co., Inc., 410 Broome St., New York City.
South Bend Lathe Works, 654 E. Madison St., South Bend, Ind.
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 654 E. Madison St., South Bend, Ind.

LATHES (Railroad Car & Driving Wheel)
William Sellers & Co., Inc., 16th & Caliowhill St., Philadelphia, Pa.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
Graybar Electric Co., 420 Lexington Ave., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gas-Mechanical)
Differential Steel Car Co., Findlay, O.

LOCOMOTIVES (Gasoline Mechanical)
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Switching and Transfer)
Cooper-Bessemer Corp., The, Mt. Vernon, O.

LUBRICANTS (Graphite)
Acheson Colloids Corp., Port Huron, Mich.
United States Graphite Co., The, Saginaw, Mich.

LUBRICANTS (Industrial
Acheson Colloids Corp., Port Huron, Mich.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Lubriplate Div., Fiske Bros. Refining Co., 129 Lockwood St., Newark, N. J.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co., Ltd., 2733 So. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

MACHINE WORK
American Metal Products Co., 5959 Linsdale Ave., Detroit, Mich.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Scaife Co., Ames St., Oakmont, Pa.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 175 Duke St., York, Pa.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNESIUM
Dow Chemical Co., Midland, Mich.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANDRELS (Expanding)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

MANGANESE ORE
Cuban-American Manganese Corp., 122 E. 42nd St., New York, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MANIPULATORS (Forging)
Alliance Machine Co., The, Alliance, Ohio.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILL BUILDINGS
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.

MILLING CUTTERS
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

MOLDINGS (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. D-1, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTOR-ROLLERS
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS (*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
American Foundry Equipment Co., The, Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

NUTS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co. Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St. Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

OILS (Cutting)
Fiske Bros. Refining Co., 129 Lockwood St., Newark, N. J.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co. Ltd., 2733 So. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Quenching)
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Maehler, Paul, Co., The, 2210 Lake St., Chicago, Ill.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OVENS (Gas or Oil Heat)
Maehler, Paul, Co., The, 2210 Lake St., Chicago, Ill.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

PACKING (Asbestos or Rubber)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

PAINT (Industrial)
Carey, Philip, Co., The, Lockland, Cincinnati, O.

PAINT (Marking)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PARALLELS
Challenge Machinery Co., Grand Haven, Mich.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERNS (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6011 Superior Ave., Cleveland, O.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

PICKLING EQUIPMENT
International Nickel Co., The, 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

PIG IRON (Charcoal)
Tennessee Products Corp., Nashville, Tenn.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co. First National Bank Bldg., Pittsburgh, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Lewin-Mathes Co., E. St. Louis, Ill.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

PLANT DISMANTLERS
Hetz Construction Co., Warren, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

PLATE LIFTING GRIPS
Downs Crane & Hoist Co., 3989 S. Normandie Ave., Los Angeles, Cal.

WHERE-TO-BUY

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3842 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Tomkins-Johnson Co., The, (Dept. S) 611 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Bending)
Cleveland Crane & Engineering Co., Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES, BRIQUETTING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Denison Engineering Co., The, 113 W. Chestnut St., Columbus, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

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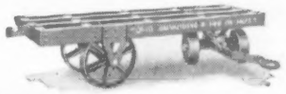
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PRESSES (Welding)—See WELDERS

PRESSURE VESSELS
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Scaife Co., Ames St., Oakmont, Pa.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PROJECTILE BANDS
Lewin-Mathes Co., E. St. Louis, Ill.

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Suply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Dept. S, Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Racine Tool & Machine Co., Racine, Wis.
Roper, The Geo. D., Corp., Rockford, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill

PUMPS (Vertical Turbine)
Layne & Bowler, Inc., Memphis, Tenn.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ames St., Oakmont, Pa.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RECTIFIERS (Dry Disc)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVET SETS
Pittsburgh Saw & Tool Co., 7[illegible] Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., (Dept. S), 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

RIVETS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill

RODS (Alloy)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

WHERE-TO-BUY

RODS (Rounds, etc.)—Con.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The Alliance, Ohio
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Monessen Foundry & Machine Co., Monessen, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL MACHINERY (Used)
Frank B. Foster, Oliver Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O. Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Smith Oil & Refining Co., Rockford, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING COMPOUNDS
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The 2700 E. 79th St., Cleveland, O.

SALT TABLETS
Fairway Laboratories, Div. The G. S. Suppiger Co., 1530 Hadley St., St. Louis Mo.
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
American Foundry Equipment Co., The, Mishawaka, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hack)
Racine Tool & Machine Co., Racine, Wis.

SAWING MACHINES (Hot and Cold)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.

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SAWING MACHINES (Hot, Cold)—Con.
Morgan Engineering Co., The, Alliance, O.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Racine Tool & Machine Co., Racine, Wis.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins, E. C., & Co., 402 So. Illinois St., Indianapolis, Ind.
Disston, Henry & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SAWS (Inserted Tooth, Cold)
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segmental)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCRAP BALING PRESSES—See BALING PRESSES

SCRAP (Iron & Steel)
Hyman-Michaels Co., 122 S. Michigan Ave., Chicago, Ill.

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oliver Iron & Steel Corp. So. 10th & Muriel Sts., Pittsburgh, Pa.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Continental Screw Corp., New Bedford, Mass.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City
Triplex Screw Co., The, 5317 Grant St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co., Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Parker-Kalon Corp., 194-200 Varick St., New York City

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The, Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co., Pawtucket, R. I.
Whitney Screw Co., Nashua, N. H.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Frantz, S. G., Co., Inc., 221-5 Centre St., New York City.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Brass, Bronze, Nickel, Silver)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Harrison Sheet Steel Co., 4718 W. 5th Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.
Wapakoneta Machine Co., The, Wapakoneta, O.

SHEARS
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hallden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., E. St. Louis, Ill.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHERE-TO-BUY

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS— See **STAMPINGS**

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

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Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Continental Steel Corp., Kokomo, Ind.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp.,
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Nickel Silver)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., East St. Louis, Mo.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Lyon Metal Products, Inc., 7201 Madison Ave., Aurora, Ill.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Scaife Co., Ames St., Oakmont, Pa.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished:

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
*Copperweld Steel Co., Warren, O. Room 117—405 Lexington Ave., New York City.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Sharon Steel Corp., Sharon, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)

Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)

Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Electric)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)

Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)

Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Products Co., The, Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strapping)

Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.

STEEL (Strip, Copper Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.
Rockefeller Bldg., Cleveland, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 3091 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Harrison Sheet Steel Co., 4718 W. 5th Ave., Chicago, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

STEEL (Strip, Tin Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) (*Also Stainless)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)

Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT

Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4809 Todd St., E. Chicago, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOPPERS (Cinder Notch)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

STORAGE EQUIPMENT
Graver Tank & Mfg. Co., Inc., 4809 Todd St., E. Chicago, Ind.
Lyon Metal Products, Inc., 7201 Madison Ave., Aurora, Ill.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., Hydraulic Press Div., 175 Duke St., York, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

SURFACE WELDING
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

TANKS (Pickling)
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4809 Todd St., E. Chicago, Ind.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ames St., Oakmont, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS (Wood or Steel, Rubber or Lead Lined)
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TERMINALS (Locking)
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stanton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TIE PLATES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co. Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Disston, Henry, & Sons, Inc., 126 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES & BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS
Mercury Manufacturing Co., 4044 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (Compressed Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TREADS (Safety)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div., American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. D-1, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4044 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Diesel)
Silent Hoist Winch & Crane Co. 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4044 S. Halsted St., Chicago, Ill.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4044 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

WHERE-TO-BUY

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4044 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Lewin-Mathes Co., E. St. Louis, Ill.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Flexible Metal)
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

TUBING (Monel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pipe & Tube Products, Inc., 445 Communipaw Ave., Jersey City, N. J.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Frasse, Peter A., & Co. Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TURRET LATHES—See LATHES (Turret)

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Greenfield Tap & Die Corp., Greenfield, Mass.

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VALVES (Blow-off)
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Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
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Western Gas Div. Koppers Co., Fort Wayne, Ind.

VALVES (Globe)
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Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Racine Tool & Machine Co., Racine, Wis.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Iron & Steel)
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.

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Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
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Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

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Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

WELDERS (Electric-Resistance)
Federal Machine & Welder Co., Dana St., Warren, O.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Lincoln Electric Co., The, Cleveland, O.
Scaife Co., Ames St., Oakmont, Pa.
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.
Western Gas Div., Koppers Co., Ft. Wayne, Ind.

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Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
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International Nickel Co. Inc., The, 67 Wall Street, New York City.
Lincoln Electric Co., The, Cleveland, O.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

WELDING RODS (Hard Surfacing)
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich. Dept. AC, Peoria, Ill.

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Air Reduction, 60 E. 42nd St., New York City.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST-22, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
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Metal & Thermit Corp., 120 Broadway, New York City
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Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Washburn Wire Co., Phillipsdale, R. I.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
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Linde Air Products Co., The, 30 E. 42nd St., New York City.
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

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Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WHEELS (Trolley)
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WIRE (Alloy Steel) (*Also Stainless)
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Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST. Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WIRE (Nickel Silver)
Seymour Manufacturing Co., The, Seymour, Conn.

WIRE (Music)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

WIRE (Round, Flat, Square, Special Shapes)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., Los Angeles, Calif.
Continental Steel Corp., Kokomo, Ind.
Page Steel & Wire Div., of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
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Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stapling)
Continental Steel Corp., Kokomo, Ind.

WIRE (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
General Electric Co., Sec. CDW-1907, Appliance & Merchandise Dept., Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York City.
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Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

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Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
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Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

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Shuster, F. B., Co., The, New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

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Continental Steel Corp., Kokomo, Ind.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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American Cable Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
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Broderick & Bascom Rope Co., 4203 N. Union St., St. Louis, Mo.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE ROPE SLINGS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Broderick & Bascom Rope Co., 4203 N. Union St., St. Louis, Mo.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
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Lewis Machine Co., 3450 E. 76th St., Cleveland, O
Shuster, F. B., Co., The, New Haven, Conn.

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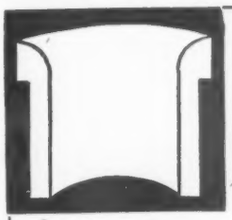
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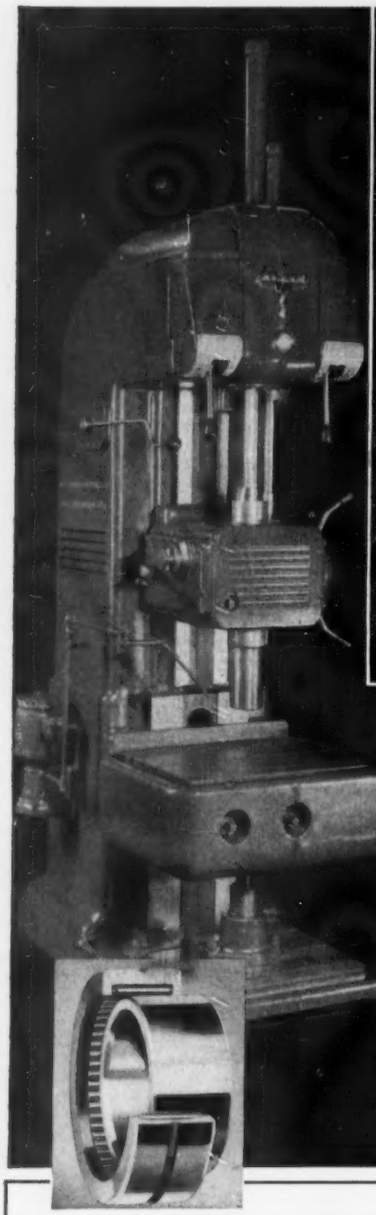
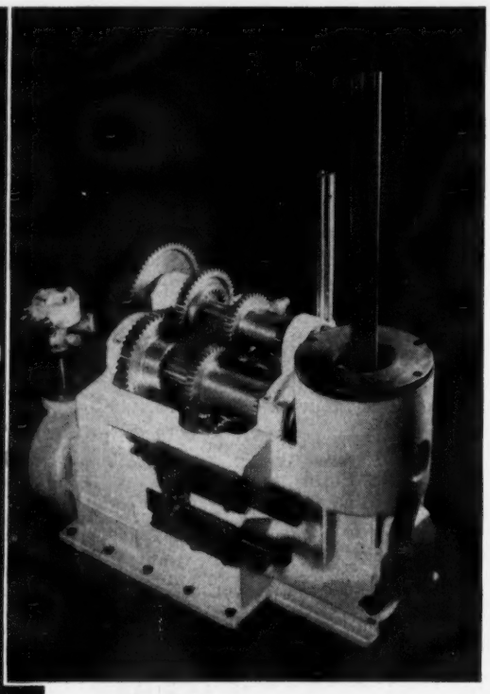
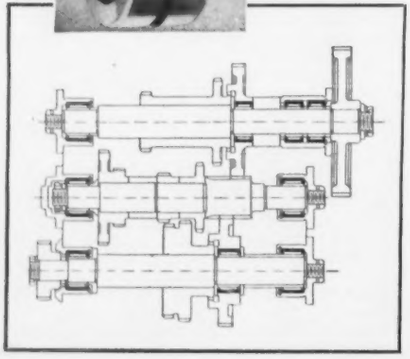
IN THE NEWS
WITH BANTAM BEARINGS

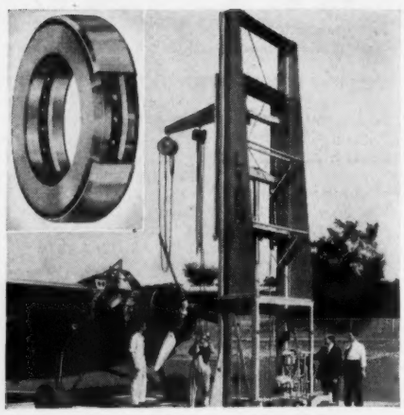




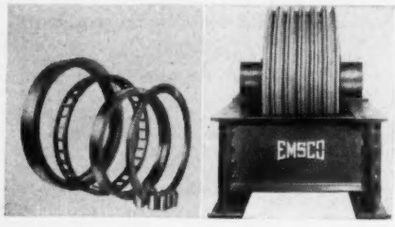
THE TOUGHEST JOBS for emergency wartime as well as peacetime needs can be handled by this new 25" geared drilling machine, manufactured by Sibley Machine & Foundry Corp. It is designed to combine tremendous power with high speed, efficient operation, and long life. The use of Bantam Quill Bearings helps to achieve this exacting performance. This is an excellent illustration of one of the ways these bearings are used in machine tools.

IN THE TRANSMISSION, fifteen Quill Bearings are used: nine on the speed side, six on the feed side. Their ability to carry heavy loads in a small space made possible the use of anti-friction bearings throughout the compact design, shown in the accompanying cross-section. Notice particularly how the use of Quill Bearings has aided in simplification of the housing design and other surrounding members. Completely self-contained, Bantam Quill Bearings are easily installed, admirably adapted for production line methods. And low initial cost helps to keep production costs down. For complete details on this unusual bearing, write for Bulletin H-104.

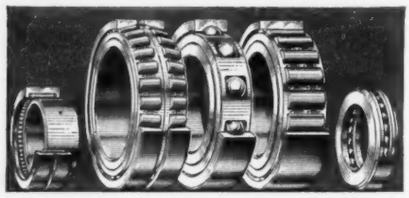




ONE OF THE LARGEST hydraulic portable elevators ever built, constructed by the LYON-Raymond Corporation, is designed for use in the installation and removal of airplane engines—including those on the largest bombers. It has a capacity of 5,000 pounds and an elevation speed of approximately 12 feet per minute. To assure efficient performance and ready maneuverability of elevator and load, Bantam Ball Thrust Bearings are used in the auto-type steering mechanism.



THE THRUST SHOULDER BUILT INTO THE OUTER RACE of this Bantam Journal Roller Bearing eliminates hazardous thrust washers and allows for compactness—a typical instance of Bantam's cooperation in equipment design. Bearings of this type are used in each of the sheaves in crown and traveling blocks built by Emsco Derrick & Equipment Co. Bantam's Journal Roller Bearings find many other uses in oil-field equipment for such applications as swivels, drawworks, slush pumps, reverse clutches, and pumping units.

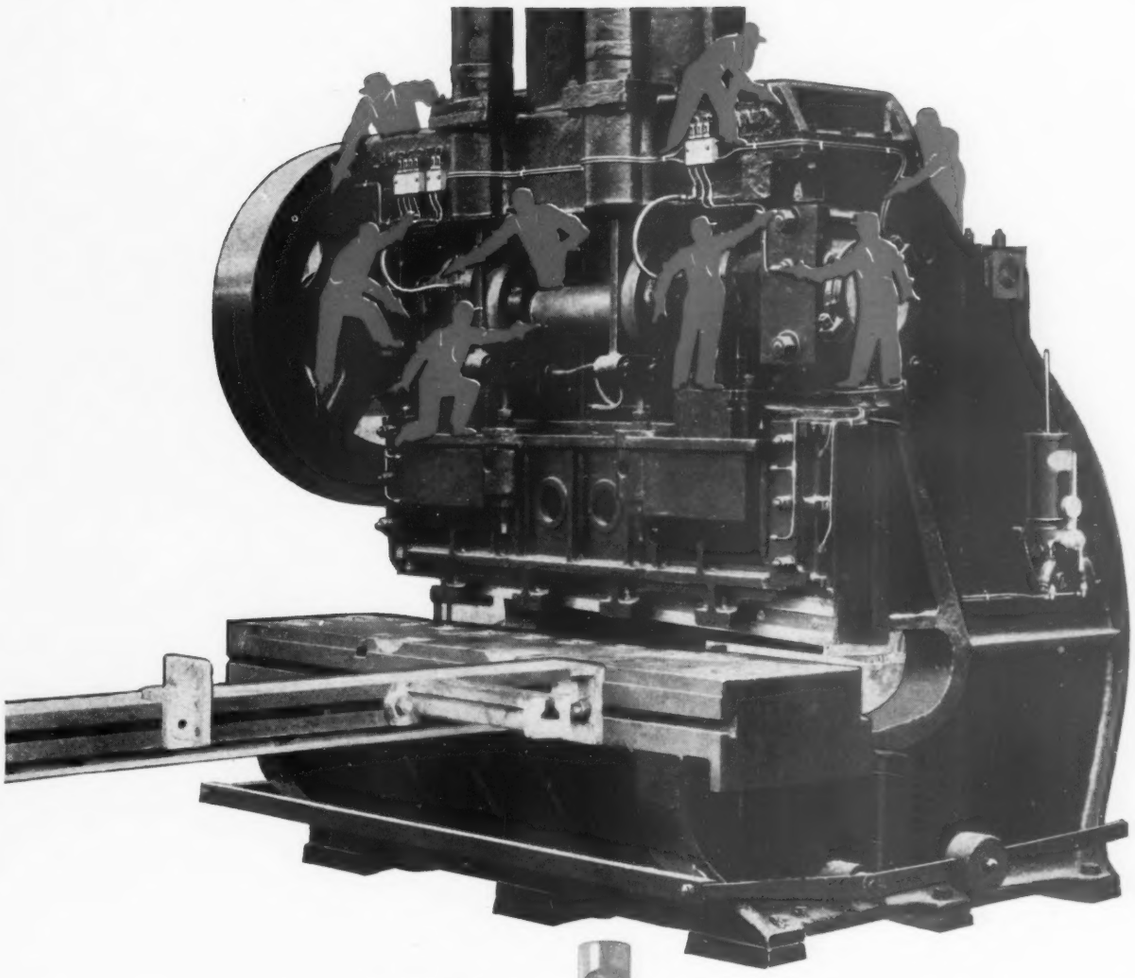


EVERY MAJOR TYPE OF ANTI-FRICTION BEARING is included in Bantam's line—straight roller, tapered roller, needle, and ball. Bantam engineers, with their broad background of experience in bearing design and application, can recommend the type that best suits your needs—and design special bearings to meet special conditions. If you have a difficult bearing problem, TURN TO BANTAM.

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

BANTAM BEARINGS CORPORATION • SOUTH BEND • INDIANA



An Expert "Oiler" at every bearing

The Farval Dualine Measuring Valve is your expert oiler at each individual bearing on your machines.

1. He measures out the exact quantity of lubricant required by *each individual* bearing—no more, no less.
2. He shoots it into the bearing under hydraulic pressure from the Farval Central Station.
3. He hoists the telltale to show you the job is done.
4. He delivers *another* charge of clean, fresh lubricant at regular intervals. With Farval, never a bearing is missed!

The Farval Centralized System of Lubrication is simple and positive, consisting of a manual or automatic Central Pumping Unit, connected to the Dualine Measuring Valves located at bearings they serve.

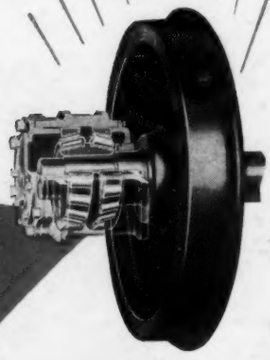
Farval on your equipment will quickly pay for itself, then will *keep on earning* by: reducing power consumption as much as 30%—increasing life of bearings up to 10 times—lowering maintenance cost by 75%—prolonging life of equipment indefinitely.

The Farval Corporation, 3270 East 80th Street, Cleveland, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Manufacturers of Automotive and Industrial Worm Gearing.
In Canada: PEACOCK BROTHERS LIMITED

TIMKEN
TAPERED ROLLER BEARINGS

TIMKEN
ALLOY STEELS



TIMKEN
RAILWAY BEARINGS

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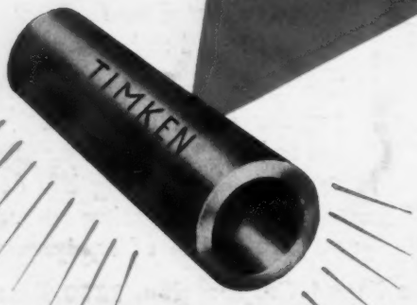

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SEAMLESS STEEL TUBING

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ROCK BITS

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO